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DISCUSSION ON THE CRITICAL THINKING DISPOSITIONS OF COMMUNITY

COLLEGE ENGLISH COMPOSITION II STUDENTS

By

MECHEL ALBANO

A doctoral dissertation submitted to the
College of Education
in partial fulfillment of the requirements
for the degree Doctor of Education
in Curriculum and Instruction

Southeastern University
November 11, 2017

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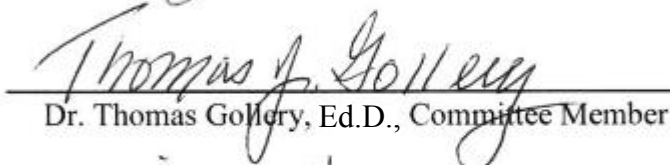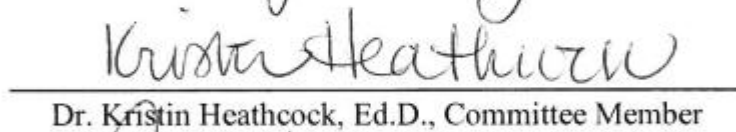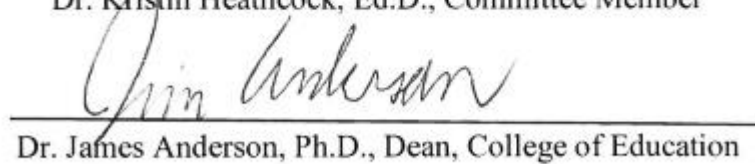

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Dedication

I would like to thank my family and friends for their constant support during this process. I would also like to thank my classmates; I was so blessed to go through this program with you! A special note of thanks goes to all of my instructors within the doctoral program. The skills and life lessons that you imparted serve me on a daily basis, both in my personal and professional life.

The greatest thanks of all goes to my Lord and Savior, Jesus Christ. From the time I was 16, Romans 8:28 has been my life verse. Thank You for always working things out for my good. I dedicate this degree to You.

Acknowledgements

I would like to thank the many instructors at Southeastern University for making this degree possible. Dr. LeBlanc, thank you for serving as my dissertation chair. I deeply appreciate all of your guidance and support during this process. Your wisdom and insight have made this dissertation possible. You are a true model of Paul and Elder's (1996) master thinker! Dr. Gollery, thank you so much for your patience in explaining the nuances of the various statistical procedures used in this study. I am a better statistician because of you!

I would also like to thank my wonderful co-workers. Teresa, thank you for always being there to listen and support me. Dr. Heathcock, thank you for your encouragement and for serving as my third reader! Nicole, thank you for allowing me the flexibility in my schedule to conduct my research. Dr. Borrell, thank you for your advice and wise counsel. Darlene, a special thanks to you for your constant support of all my professional goals. I wouldn't be here without all of you!

Abstract

The area of critical thinking skills has been one of concern for many professionals

working in the field of higher education (Nicholas & Raider-Roth, 2016; Shim &

Walczak, 2012). The purpose of this study was to provide these professionals with sound

pedagogical tools that can be used to assist college students in developing their critical

thinking skills and dispositions. Using a sample of 34 English Composition II students

from a community college in the Southeast, the researcher employed a pre-test/post-test

comparison group design to compare the effects of small-group discussion of higher-

order questions to the effects of whole-group discussion on students' critical thinking

dispositions. The students' critical thinking dispositions were measured through the

California Critical Thinking Disposition Inventory (CCTDI) (Facione, P., & Facione, N.,

2007). Independent t-tests revealed no significant differences between the post-test

composite and subscale CCTDI scores of students who addressed higher-order questions

through small-group discussion and students who addressed the same questions via

whole-group discussion. Despite the lack of significant findings, the study has

implications for instructors wishing to use discussion as part of their critical thinking

pedagogy.

Key Words: [active learning, critical thinking, discussion, instructional strategies]

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Chapter 1: Introduction

Researchers have defined critical thinking as a skill that includes "attitudes, habits, values, and behavior" (Rickles, Schneider, Slusser, Williams, & Zipp, 2013, p. 272). Sousa (2011) added further insight into the concept of critical thinking by describing it as the ability to make "judgements using objective criteria and offering opinions with reasons" (p. 253). Expanding on Sousa's definition, Panettieri (2015) explained that critical thinking incorporates the ability to "conceptualize, analyze, synthesize, evaluate, and apply information to reach accurate conclusions" (p. 687). The author elaborated on this view of critical thinking by further describing it as "self-guided, self-disciplined thinking based upon background information, practical experience, evidence, and reason" (Panettieri, 2015, p. 688).

In the 1980's, the ability for students to think critically became a major focus of universities in the United States (Facione, 1990; Nicholas & Raider-Roth, 2016). Facione (1990) asserted that the critical thinking movement involved an emphasis on "the processes of inquiry, learning, and thinking rather than in the accumulation of disjointed skills and senescent information" (p. 4). Universities began offering critical thinking courses and including critical thinking as part of their general education requirements (Facione, 1990).

Currently, the development of students' critical thinking skills continues to be an important goal of higher education (Shim & Walczak, 2012). Many universities have incorporated critical thinking into their general education programs as a "core pedagogical and curricular outcome" (Nicholas & Raider-Roth, 2016, p. 2). For example, undergraduate students at Marshall University in Huntington, West Virginia,

must complete nine hours of critical thinking general education core courses, including a first-year seminar that emphasizes problem-solving and hands-on learning (Marshall University, 2017).

Additionally, a critical thinking component can be seen in the mission statements of a number of colleges and universities (Nicholas & Raider-Roth, 2016). For example, the mission statement of Lafayette College in Easton, Pennsylvania, includes the following: "The College strives to develop students' skills of critical thinking, verbal communication, and quantitative reasoning and their capacity for creative endeavor…" (Lafayette College, 2017, para 1). Similarly, the mission statement for Marietta College in Marietta, Ohio, reads as follows: "Marietta College provides a strong foundation for a lifetime of leadership, critical thinking, and problem solving" (Marietta College, 2017, para 1).

Further evidence on the commitment to critical thinking at the postsecondary level can be found in the fact that critical thinking has played a role in the college and university accreditation process. For example, as part of reaccreditation with the Southern Association of Colleges and Schools (SACS), the University of Louisville created a Quality Enhancement Plan (QEP) that focused on improving undergraduates' critical thinking skills through an emphasis on critical thinking within the general education program, as well as in a final project (University of Louisville, 2017). Similarly, the University of Texas of the Permian Basin also incorporated critical thinking into their Quality Enhancement Plan (QEP) (UTPB, 2017). The first stage of the university's QEP involved the integration of critical thinking into introductory English composition courses; this first implementation stage was followed by a second stage in

which a critical thinking component was introduced into other general education courses (UTPB, 2017). The final stage was the creation of a faculty learning community to support instructors in the implementation of critical thinking within their courses (UTPB, 2017).

In response to this emphasis on critical thinking within the postsecondary environment, several research studies have been conducted on critical thinking and college students (Loes & Pascarella, 2015; Saiz, Rivas, & Olivares, 2015; Shim & Walczak, 2012). Some of these studies investigated the relationship between student behaviors and the development of critical thinking skills (Laird, Seifert, Pascarella, Mayhew, & Blaich, 2014). Other research studies examined the impact of instructor characteristics on students' critical thinking development (Loes & Pascarella, 2015). Finally, a number of research studies explored the relationship between critical thinking and specific instructional techniques, such as the use of discussion, rubrics, and primary source documents (Dallimore, Hertenstein, & Platt, 2008; Pollock, Hamann, & Wilson, 2011; Saiz, Rivas, & Olivares, 2015; D. Van Camp & W. Van Camp, 2013).

While these studies provided insight into college students' critical thinking, the research also had several limitations (Rickles et al., 2013; Shim & Walczak, 2012). Some of the questions regarding the research focused on the use of unclear definitions when referring to instructional practices (Shim & Walczak, 2012). Other critiques centered on the lack of rigor with regards to quantitative methodologies (Rickles et al., 2013). Finally, some reviews expressed concerns that the research did not differentiate between "critical thinking skill acquisition in 'normal settings' or in deliberately experimental settings" (Rickles et al., 2013, p. 273).

The implications for these limitations in research can be better appreciated when considering recent findings on postsecondary critical thinking instruction. Many college instructors struggle to teach higher-order thinking and critical thinking (Panettieri, 2015; Shim & Walczak, 2012). Shim and Walczak (2012) asserted that "those teaching critical thinking at the college level do not fully understand how to effectively teach these skills and are unable to transfer critical thinking knowledge into their classrooms" (p. 16). Through their qualitative study of faculty at two large public universities, Nicholas and Raider-Roth (2016) suggested possible reasons for instructors' difficulties in teaching critical thinking. According to the researchers, many faculty had no explicit way to assess the effectiveness of their critical thinking instruction; instead, they "taught and assessed critical thinking implicitly through disciplinary content and contexts" (Nicholas & Raider-Roth, 2016, p. 5).

The research on postsecondary critical thinking instruction takes on unique significance within the specialized environment of community colleges. In the fall of 2014, 12.3 million students (credit and non-credit) attended the nation's community colleges (AACC, 2017). However, Varelas, Wolfe, and Ialongo (2015) asserted that many of these students entered community colleges "underprepared in basic skills needed to succeed and are at dramatically different levels with regard to these abilities" (p. 77). In fact, Crisp and Delgado (2014) estimated that two-thirds of community college students did not have the requisite college-level skills in at least one subject.

An examination of completion rate data can help frame the above discussion of community college students' skill deficits. For example, an analysis of college completion rate data reported in accordance with the Student Right-to-Know federal

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legislation revealed that 19.4% of first-time, full-time students who entered a community college in the fall of 2010 earned an associate's degree or certification within three years (AACC, 2015). In addition, the data showed that 17.8% of students from the 2010 cohort transferred to another institution within three years (AACC, 2015). These percentages increased when considering completion rates for a greater time period (AACC, 2015). According to reports by the National Student Clearinghouse (2014-2015), 42.9% of students who entered a community college in 2008 earned an associate's degree in six years; an additional 14.1% of students from this cohort transferred to another institution within six years (as cited in AACC, 2015).

In light of the previously mentioned completion rate data, the researcher postulated that growth in community college students' critical thinking skills could serve to increase the number of students who earn their associate degree or certification within three years, thus meeting a common benchmark applied to the evaluation of colleges (Florida College System, 2017). Additionally, the researcher surmised that an increase in critical thinking and dispositions toward critical thinking would enable graduates to enter the workforce with the requisite skills to be successful. These two assumptions served as the motivation behind the current study.

The purpose of this study was to assess the influence of small-group versus whole-group discussion of higher-order thinking questions on the development of critical thinking dispositions of students participating in a community college English Composition II course. According to Pollock, Hamann, and Wilson (2011), discussion is a type of active learning associated with increases in critical thinking and "higher-order, deep learning" (p. 49). Through its focus on the relationship between instruction and

critical thinking, the current study examined the effectiveness of two types of discussion on students' dispositions to think critically. These critical thinking dispositions included inquisitiveness, open-mindedness, and confidence in one's ability to reason (Facione, 1990).

Theoretical Background of the Study

The study's theoretical foundation was derived from research on critical thinking, cognition, social constructivism, active learning, higher-order questioning, and postsecondary English instruction. In his 1933 book, *How We Think,* John Dewey focused on the importance of encouraging students to develop "wide-awake, careful, thorough habits of thinking" (p. 78). Dewey's main goal was for students to demonstrate "reflective thinking" (p. 3), which required exposing students to a problem or question, and then providing them with the conditions in which they could find a solution. Dewey urged educators to avoid focusing on the correct answer and instead to emphasize the "mental process" (p. 65) by which the answer was attained.

Mental processes were also the focus of cognitive development theorists who sought to understand "the changes and developments that occur in the thinking and reasoning of the child" (Oakley, 2004, p. 10). One such researcher, Jean Piaget, developed a theory of cognitive development in which children passed through fixed stages of development as their brains matured and their cognitive abilities increased (Oakley, 2004). According to Piaget, development began at the sensorimotor stage (ages 0–2 years), in which children relied on built-in reflexes due to their inability to integrate information (Oakley, 2004). As their brains matured, children moved to the pre-operational stage (ages 2-6), which involved the use of symbols and language to represent

items in the environment, as well as the understanding that size and amount remained fixed, even if an item, such as a glass of water, was transferred to a different container (Oakley, 2004). In the next stage, concrete operational (ages 7-12), children created strategies for understanding the world (inductive logic) and solved problems that they could see and manipulate (Oakley, 2004). Individuals in the final stage of development, termed formal operational (ages 12-adult), could think abstractly and use deductive logic to systematically solve hypothetical problems in a logical order (Oakley, 2004).

Piaget's research had direct applications to the field of education (Oakley, 2004). For example, Piaget promoted the idea that teachers should encourage students to be actively engaged in learning through "exploration, observation, testing, and information organization" (Ewing, Foster, & Whittington, 2011, p. 69). Additionally, Piaget's work supported the idea of "child-centered learning" (Oakley, 2004, p. 31), which advocated that teachers should consider students' developmental stages and ensure that they were "cognitively ready to learn new concepts" (p. 31). In other words, teachers should carefully judge whether tasks were below or beyond students' level of cognitive development (Oakley, 2004).

One way of measuring the cognitive level of instructional tasks was through the application of Bloom's Taxonomy of Educational Objectives (Ewing, Foster, & Whittington, 2011; Moseley et al., 2005). Benjamin Bloom, Associate Director of the Board of Examinations at the University of Chicago, and a group of measurement experts from other universities originally developed the taxonomy in an attempt to create a bank of test items that could be organized according to educational objectives (Krathwohl, 2002). Bloom and his graduate students created a hierarchy of learning outcomes in

which each category built upon the previous category (Moseley et al., 2005). These categories, in order of least to most complex, included knowledge, comprehension, application, analysis, synthesis, and evaluation (Krathwohl, 2002). In 2001, the taxonomy was revised to focus more closely on what students should do as the result of instruction (Moseley et al., 2005). Accordingly, the names of the categories, still in increasing levels of complexity, became the following verbs: remember, understand, apply, analyze, evaluate, and create (Krathwohl, 2002).

In designing the original taxonomy, Bloom focused on the relationship between knowledge development and students' "intellectual abilities and skills" (Moseley et al., 2005, p. 47). By classifying educational goals in the cognitive domain according to levels of complexity, Bloom drew "attention to outcomes which require different levels of thinking" (p. 45). Accordingly, Bloom's Taxonomy could be used to determine "the cognitive levels at which teachers and learners process classroom content" (Ewing, Foster, & Whittington, 2011, p. 69).

While Piaget and Bloom's work focused on the cognitive aspects of learning, the theories of Lev Vygotsky, a contemporary of Piaget, combined cognitive development with social development (Mooney, 2013). Specifically, Vygotsky theorized that "social and cognitive development work together and build on each other" (p. 100). As part of his theory of social constructivism, Vygotsky stressed that individuals construct knowledge through the combination of classroom social interactions and "a personal critical thinking process" (Powell & Kalina, 2009, p. 243). An important tenet of Vygotsky's theory was the idea of scaffolding, in which teachers and peers assist the learner in reaching "the next level of understanding" (p. 244).

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A major difference between the work of Piaget and Vygotsky can be seen in the two theorists' differing views on the development of language (Powell & Kalina, 2009). Whereas Piaget theorized that "thinking precedes language" (Powell & Kalina, 2009, p. 241), Vygotsky asserted that "language precedes thinking" (p. 241). Vygotsky believed that, through the use of language, individuals are able to participate in the shared social experiences that lead to cognitive development (Mooney, 2013).

Some educators assert that, in the United States, Vygotsky's work received less attention due to the focus on Piaget's theories within education (Mooney, 2013). In fact, one may speculate that the critical thinking movement of the 1980's (Facione, 1990; Nicholas & Raider-Roth, 2016) reflected this previous emphasis on cognitive development. As part of the critical thinking movement, theorists supported changes in curriculum, pedagogy, and assessment that would increase students' critical thinking (Facione, 1990). Their main argument was that increased critical thinking would benefit both students and "society in general" (Facione, 1990, p. 4). However, with the added emphasis on critical thinking in education, instructors were confronted with important questions regarding how to best implement and assess critical thinking instruction within their classrooms (Facione, 1990). The answer to this issue required a fundamental definition of critical thinking that could guide all educators (Facione, 1990).

In 1987, the American Philosophical Association enlisted Peter Facione to investigate the current state of critical thinking instruction and assessment (Facione, 1990). Facione (1990) employed the Delphi Method (p. 4), which involved having 46 experts from various fields (philosophy, education, social sciences) meet in panel discussions to discuss the role of critical thinking in education. As a result of the panel

meetings, the experts reached consensus definitions for both the cognitive and dispositional aspects of critical thinking (Facione, 1990). The experts defined the cognitive aspects of critical thinking 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. 3). Furthermore, the panel defined critical thinking dispositions as "the personal traits, habits of mind, attitudes, or affective dispositions which seem to characterize good critical thinkers" (Facione, 1990, p. 20). These personal traits included inquisitiveness, open-mindedness, flexibility, and persistence in seeking answers (Facione, 1990). Through the panel discussions, the experts were able to not only clarify the cognitive skills involved in critical thinking, but also to identify the characteristics of the "ideal critical thinker" (Facione, 1990, p. 3).

Further understanding of critical thinking was provided through the work of Paul and Elder (1996), who defined critical thinking as an individual's ability to improve his or her thinking through regular self-assessment. Paul and Elder (2010) created a developmental model of critical thinking in which individuals pass through the following six stages: the "unreflective thinker" who does not recognize the role of thinking in his or her life; the "challenged thinker" who possesses a beginning awareness of the importance of thinking; the "beginning thinker" who begins to take control of his or her thinking; the "practicing thinker" who recognizes necessary thinking habits; the "advanced thinker" who has developed efficient habits of thought; and the "master thinker" who constantly monitors and revises his or her thinking strategies (as cited in Doyle, 2012). As with Piaget's stages of cognitive development (Oakley, 2004), Paul and Elder's (1996) critical

thinking stage model asserted that individuals progressed through each stage of thinking in a sequential manner, though at different ages and in different conditions (Doyle, 2012). This progression from one stage to the next was dependent upon the individual's commitment to continual self-assessment (Paul & Elder, 1996).

While delineating their stages of critical thinking development, Paul and Elder (1996) also identified intellectual traits that described each stage; as individuals moved through the stages, they added to the intellectual traits inherent in the previous stage. The exception was the beginning stage titled the "unreflective thinker," for whom Paul and Elder (1996) identified no corresponding intellectual traits. However, once individuals moved into the "challenged thinker" stage, they demonstrated the intellectual trait of humility, which allowed them to recognize the problems within their own thinking (Paul & Elder, 1996). Upon moving into the "beginning thinker" stage, individuals also displayed confidence in reasoning and intellectual perseverance (Paul & Elder, 1996). These traits of perseverance, confidence, and humility strengthened as individuals entered the "practicing thinker" stage; individuals also added intellectual insight, integrity, empathy, and courage upon entry into the "advanced thinker" stage (Paul & Elder, 1996). Once individuals entered the "master thinker" stage, they were able to integrate all of these intellectual traits on a higher level (Paul & Elder, 1996). One will note that the intellectual traits identified by Paul and Elder (1996) exhibit a marked similarity to the critical thinking dispositions identified by the Delphi panel (Facione, 1990), such as open-mindedness and persistence in finding answers.

In presenting their stage theory of critical thinking, Paul and Elder (1997) were adamant about the role of critical thinking instruction. According to the theorists, in

order for students to pass through the critical thinking stages, instructors must engage in explicit teaching of critical thinking (Paul & Elder, 1997). Paul and Elder argued that many students enter college at the "unreflective thinker" stage of critical thinking development; the theorists also stressed that, without appropriate instruction, students could possibly graduate from college without advancing out of this beginning stage. The theorists concluded that instructors have the responsibility of using explicit critical thinking instruction to assist students in developing their thinking ability (Paul & Elder, 1997).

When tracing the history of critical thinking in postsecondary education, one may infer that the insight provided by the Delphi panel (Facione, 1990), as well as the work of Paul and Elder (1996), helped to pave the way for the increased focus on both critical thinking skills and dispositions that was seen in the 1990's (Halpern, 1999; U.S. Department of Education, 1991). Critical thinking was put at the forefront of educational policy when, in 1990, U.S. President George H. Bush and several governors promoted six national educational goals as part of a program entitled "America 2000" (U.S. Department of Education, 1991, p. 20). Goal 5, Objective 5 of the America 2000 initiative called for a significant increase in the "proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems" (U.S. Department of Education, 1991, p. 65).

Similar to the conclusions of the Delphi panel (Facione, 1990) and the writings of Paul and Elder (1996), more recent educators also called for direct instruction of critical thinking that would address both cognitive skills and dispositions (Halpern, 1999). A commonly held belief by educators was that critical thinking skills could be learned and,

by doing so, students would "become better thinkers" (Halpern, 1999, p. 70). In keeping with Paul and Elder (1997), many educators advocated for explicit teaching of critical thinking in a manner that would promote "transfer across academic domains" (Halpern, 1999, p. 70). Finally, echoing Dewey's (1933) assertion that educators should help students develop precise "habits" (p. 78) or dispositions of thought, many educators encouraged students to "value good thinking" (Halpern, 1999, p. 72). Halpern (1999) summed up educators' concerns over critical thinking dispositions by stating, "It is not enough to teach college students the skills of critical thinking if they are not inclined to use them" (p. 72).

Continuing the work of the Delphi Panel (Facione, 1990) and Paul and Elder (1996), contemporary scholars have added to the theoretical background underpinning critical thinking instruction (Hamilton & Klebba, 2011; Limbach & Waugh, 2014; Panettieri, 2015; Sousa, 2011). For example, Sousa (2011) asserted that instruction in critical thinking skills should require students to process learning "at higher levels of complexity" (p. 254). In order to achieve this higher level of processing, students should participate in activities that require them to operate at the three top levels of Bloom's Revised Taxonomy: evaluate, analyze, and create (Sousa, 2011).

The type of higher level processing promoted by Sousa (2011) can be achieved through active learning strategies, which involve "students in doing things and thinking about the things they are doing" (Bonwell & Eison, 1991, p. 2). Petress (2008) defined active learning as "a process where the learner takes a dynamic and energetic role in one's own education" (p. 566). In general, active learning strategies can positively impact critical thinking by enabling students to "incrementally progress from lower to

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higher cognitive processing tasks" (Hamilton & Klebba, 2011, p. 2). In addition, active

learning strategies promote deeper learning by requiring students to "solve problems and

think critically" (Limbach & Waugh, 2014, p. 96). Some examples of these learning

strategies include discussion, questioning, role playing, case studies, simulations, and

experiential learning (Dallimore, Hertenstein, & Platt, 2008; Hamilton & Klebba, 2011;

Pollock, Hamann, & Wilson, 2011; Panettieri, 2015).

One active learning strategy in particular, discussion, has direct relevance to the

current study. As explained by Dallimore, Hertenstein, and Platt (2008), "class

discussion is active and linked to the development of critical thinking and problem

solving" (p. 163). Additionally, as opposed to lecture, class discussion promotes

reflective thinking and retention of information (Dallimore et al., 2008). In the current

study, the use of small-group discussion was compared to whole-group discussion with

regard to both discussion methods' influence on students' critical thinking dispositions.

In addition to its categorization as an active learning strategy, discussion can also

be viewed as a type of cooperative learning, in which students work together in small

groups "to maximize their own and each other's learning" (Johnson, D., Johnson, R., &

Smith, 2014, p. 87). A major tenet of cooperative learning is the idea of "positive

interdependence" (p. 93), in which students view their success as interrelated with the

success of their groupmates. Research demonstrates that the use of cooperative groups

with pairs and groups of four lead to "higher achievement and greater academic support

from peers than…individualistic learning" (Bertucci, Conte, Johnson, D., & Johnson, R.,

2010, p. 256). This relationship between group size and achievement is relevant to the

current study, which compared small discussion groups of two and four to whole-class discussion.

Additional support for the current study's focus on discussion can be found in the proceedings of the American Educational Research Association's (AERA) September 2011 conference in Pittsburg, Pennsylvania (Resnick, Asterhan, & Clark, 2015). The researchers presented data suggesting that students who participated in the instructional use of discussion performed better on standardized academic achievement tests, retained what they had learned, and transferred their knowledge to other areas (Resnick, Asterhan, & Clark, 2015). The presenters theorized that the use of discussion increases cognitive demand on students, thus leading to greater opportunities for learning (Resnick, Asterhan, & Clark, 2015).

In keeping with the AERA conference's focus on the impacts of discussion on student learning, researchers have examined several different instructional techniques that facilitate the classroom use of discussion (Resnick, Asterhan, & Clark, 2015). One of these methods, known as dialogic teaching, involves the use of open-ended questions posed by the instructor, followed by collaborative discussion in which students have shared control (Retnitskaya, & Gregory, 2013). Research suggests that dialogic teaching encourages the development of higher-order thinking and leads to "deeper understanding of subject-matter knowledge" (p. 114). Specifically, through dialogic teaching, students are required to apply "rational thinking" (p. 115) in order to make "reasonable judgements" (p. 115).

With its focus on the use of open-ended questions and the application of reason within discussion to address questions (Retnitskaya, & Gregory, 2013), the research on

dialogic teaching has direct implications for the current study, which included the use of two different types of discussion (small- versus whole-group) to address higher-order questions. Crawford (2005) postulated that the integration of higher-order questions within discussion requires students to employ critical thinking in order to develop an answer; therefore, students better understand that there may be more than one valid answer to these questions. Furthermore, Crawford (2005) asserted that the use of higher-order questions during discussion encourages "students to locate important information and use it to draw conclusions and make comparisons" (p. 6). By doing so, students' critical thinking develops as they engage in "actively asserting some position about causes or relationships" (Crawford, 2005, p. 5).

In addition to the inclusion of higher-order questions within classroom discussions, these higher-order questions can also be integrated into English instruction through the assignment of writing tasks, which are a form of active learning that promotes both critical and creative thinking (Davis, 1992). Neuroscience research reveals that the brain's left hemisphere (LH) promotes the language and logical/analytical thought necessary for critical thinking, while the right hemisphere (RH) promotes the spatial relationships and imagery necessary for creative thinking (Davis, 1992). When students engage in language activities such as listening, speaking, reading, and writing, both brain hemispheres are integrated through the "verbal knowledge of the LH and visual-spatial abilities of the RH" (p. 3). In turn, the integration of the hemispheres through the production of language produces "both critical and creative thinking for discovering or inventing insightful ideas" (p. 2). In light of this research, Davis (1992) advocated that students frequently engage in the writing process and discuss their writing

with both teachers and peers. In so doing, students are able to become "participants in active thinking and learning of the subject matter through their own writing processes" (p. 4).

The proposed connections between critical thinking (Sousa, 2011), active learning (Hamilton & Klebba, 2011; Limbach & Waugh, 2014; Panettieri, 2015), class discussion (Dallimore, Hertenstein, & Platt, 2008; Pollock, Hamann, & Wilson, 2011; Resnick, Asterhan, & Clark, 2015; Retnitskaya, & Gregory, 2013), higher-order questioning (Crawford, 2005), and English instruction (Davis, 1992) served as the impetus behind the current research study. The researcher was especially interested in gathering data on the relationship between students' critical thinking dispositions and the discussion of higher-order thinking questions within a community college English II classroom. To facilitate this research goal, the researcher compared the effects of small-group versus whole-class discussion of higher-order thinking questions on the critical thinking dispositions of students enrolled in a community college English Composition II course.

Purpose Statement

The purpose of this study was to evaluate the impact of small-group versus whole-group discussion of higher-order thinking questions on the development of critical thinking dispositions of students enrolled in a community college English Composition II course.

Research Question

The study focused on the following research question:

Q1: What are the differences between the critical thinking dispositions of community college English Composition II students based on small-group versus whole-group discussion of higher-order thinking questions?

Research Hypothesis

H1: There is a significant difference between the critical thinking dispositions of community college English Composition II students who engaged in small-group discussion of higher-order thinking questions and community college English Composition II students who engaged in whole-class discussion of higher-order thinking questions.

Research Design

This study employed a randomly assigned, pre-test/post-test comparison group design to address the research question and hypothesis. The independent variable in the study was the type of discussion: small-group versus whole-group discussion of higher order questions. The dependent variable in the study was the post-test composite and subscale scores on the California Critical Thinking Disposition Inventory (CCTDI) (Facione, P., & Facione, N., 2007).

Method

The study's sample was chosen from the English Composition II courses at a community college in the southeastern United States. Employing a nonequivalent control group design (Gay, Mills, & Airasian, 2012), the researcher used a coin flip to randomly assign the 11:00 am section of the course as the experimental group ($n = 24$) and the 1:00

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pm section as the control/comparison group (*n* = 25). Due to course withdrawals and the

exclusion of students under 18, the final sample consisted of 17 subjects in each group.

To address the research question and hypothesis, four small-group discussion

strategies were implemented with the experimental group: "think, pair, share" (Kaddoura,

2013), "quick write" (Himmele, P., & Himmele, W., 2011), "Roundtable Writing," and "I

Say Review" (Kaufman & Wandberg, 2010). The four strategies, which were used on a

rotating basis once a week for 14 weeks, incorporated a higher-order question for

reflection and discussion during class time. Over the same 14-week period, subjects in

the control/comparison group were asked the same higher-order questions, which were

addressed through whole-group discussion in class.

Several variables were held constant between the experimental and control groups.

For example, the two groups studied the same topics and received the same assessments.

In addition, both groups read the same short stories and were given the same higher-order

questions to discuss. Finally, both groups were taught by the same instructor on the same

two days of the week: Mondays and Wednesdays.

Pre-test and post-test data on the groups' critical thinking dispositions were

gathered using the California Critical Thinking Disposition Inventory (CCTDI) (Facione,

P., & Facione, N., 2007), which was developed in the early 1990's after the publication

of the Delphi report (Insight Assessment, 2017). The subjects' composite and subscale

scores on the CCTDI served as the dependent variables of the study, and type of

discussion (small- versus whole-group) served as the independent variable. As explained

by Facione, P., Facione, N., and Giancarlo (2000), the Delphi report from which the

CCTDI was developed "expressed a consensus construct of critical thinking" (p. 12).

Therefore, in the current study, the researcher felt confident in using the CCTDI to measure the critical thinking dispositions of the community college English Composition II students who comprised the subjects of the study.

At the end of the semester, the researcher also collected qualitative data through student focus group interviews and an instructor interview. To ensure data accuracy, the researcher digitally recorded the interviews. A review of the interview transcripts yielded qualitative data that were used to frame the discussion of the study results in chapter five. The combination of quantitative and qualitative data were used by the researcher to provide a holistic picture of the impact of small- versus whole-group instruction in college students' critical thinking dispositions.

Delimitations

1. This study collected data on students' critical thinking dispositions, which have been defined as the personal characteristics and habits that define critical thinkers (Facione, 1990). The study did not directly measure the cognitive aspects of critical thinking, such as students' ability to engage in "interpretation, analysis, evaluation, and inference" (Facione, 1990, p. 3). However, the higher-order thinking questions used in the study required students to engage in these cognitive activities (Crawford, 2005; Sousa, 2011).

2. Only four small-group discussion strategies were used with the experimental group in this study: "think, pair, share" (Kaddoura, 2013), "quick write" (Himmele, P., & Himmele, W., 2011), "Roundtable Writing," and "I Say Review" (Kaufman & Wandberg, 2010). One discussion strategy was used each week on a rotating basis during instruction.

3. The researcher focused on the determination of changes in critical thinking

dispositions during a 14-week period of time.

Limitations

The researcher used two intact community college English Composition II

classes; therefore, she was not be able to randomly select subjects to participate in either

the experimental or control groups. Accordingly, a quasi-experimental design was

implemented that involved "random assignment of intact groups to treatments, not

random assignment of individuals" (Gay, Mills, & Airasian, 2012, p. 270). The

researcher compensated for the nonequivalent control group design by choosing classes

that were "as equivalent as possible" (p. 270). Specifically, both sections of the English

Composition II course were taught by the same instructor on the same two days of the

week. In addition, both sections used the same textbook and met in the middle part of the

instructional day: at 11:00 a.m. and 1:00 p.m., respectively.

Another limitation of the study was the relatively small sample size. At the

study's beginning, the experimental group consisted of 24 students, and the control group

consisted of 25 students. By the end of the study, that number had diminished due to

student withdrawals and the exclusion of students who were under the age of 18. As a

result, the final count for both the experimental and control groups was 17 in each group.

Despite the small sample size, the researcher was able to use both the independent

samples t-test and the paired samples t-test to analyze the CCTDI quantitative data and to

address the research question. After conducting a simulation study that examined the use

of the t-test with sample sizes ranging between two and five, de Winter (2013) found that

the rate of Type I errors did not exceed 5%. Thus, de Winter concluded that "there is no

fundamental objection to using a regular *t*-test with extremely small sample sizes" (p. 6). De Winter also concluded that paired sample *t*-tests are also "feasible with extremely small sample sizes" (p. 6). Based on de Winter's (2013) findings, the researcher proceeded with the analyses using *t*-tests with sample sizes of 17.

Furthermore, to determine the statistical power of the two sample sizes, "a priori" analyses were conducted (T. Gollery, personal communication, August 10, 2017). These analyses consisted of finding the statistical power of the two samples using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009). Finally, the study used qualitative data from student focus group interviews and an instructor interview to triangulate the quantitative data from the CCTDI (Facione, P., & Facione, N., 2007).

Definitions

Active learning is a process in which one "takes a dynamic and energetic role in one's own education" (Petress, 2008, p. 566).

Advanced thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual has developed efficient habits of thought (as cited in Doyle, 2012).

Analyticity is a critical thinking disposition in which individuals "anticipate both the good and the bad potential consequences or outcomes of situations, choices, proposals, and plans" (Insight Assessment, 2017, p. 13).

Beginning thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual begins to take control of his or her thinking (as cited in Doyle, 2012).

Challenged thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual possesses a beginning awareness of the importance of thinking (as cited in Doyle, 2012).

Community colleges are "regionally accredited public colleges, who primarily offer an associate's degree as their highest award" (AACC, 2015).

Confidence in reasoning is a critical thinking disposition characterized by the "tendency to trust reflective thinking to solve problems and to make decisions" (Insight Assessment, 2017, p. 13).

Cooperative learning is an instructional strategy in which students work together in small groups "to maximize their own and each other's learning" (Johnson, D., Johnson, R., & Smith, 2014, p. 87).

Critical thinking involves the student's ability to "conceptualize, analyze, synthesize, evaluate, and apply information to reach accurate conclusions" (Panettieri, 2015, p. 687).

Critical thinking dispositions are the "personal traits, habits of mind, attitudes or affective dispositions which seem to characterize good critical thinkers" (Facione, 1990, p. 20).

Dialogic teaching is an instructional strategy that involves the use of open-ended questions by the teacher, followed by collaborative discussion in which students have shared control (Retnitskaya, & Gregory, 2013).

Higher-order questions are questions that are "phrased so that the person providing the answer must engage in critical thinking" (Crawford, 2005, p. 5).

Inquisitiveness is a critical thinking disposition that can be described as an individual's "tendency to want to know things, even if they are not immediately or obviously useful at the moment" (Insight Assessment, 2017, p. 13).

Master thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual constantly monitors and revises his or her thinking strategies (as cited in Doyle, 2012).

Maturity of judgement is a critical thinking disposition in which an individual "understands that multiple solutions may be acceptable while yet appreciating the need to reach closure at times even in the absence of complete knowledge" (Insight Assessment, 2017, p. 13).

Open-mindedness is a critical thinking disposition characterized as "the tendency to allow others to voice views with which one may not agree" (Insight Assessment, 2017, p. 13).

Practicing thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual recognizes necessary thinking habits (as cited in Doyle, 2012).

Social constructivism is the idea, based on Lev Vygotsky's work, that individuals construct knowledge through the combination of classroom social interactions and "a personal critical thinking process" (Powell & Kalina, 2009, p. 243).

Systematicity is a critical thinking disposition in which individuals "approach problems in a disciplined, orderly, and systematic way" (Insight Assessment, 2017, p. 13).

Truth-seeking is a critical thinking disposition that involves "following reasons and evidence wherever they may lead, even if they lead one to question cherished beliefs" (Insight Assessment, 2017, p. 13).

 Unreflective thinker is a stage in Paul and Elder's (1996) critical thinking model in which the individual does not recognize the role of thinking in his or her life (as cited in Doyle, 2012).

Significance of the Study

For professionals working in postsecondary education, the development of critical thinking and dispositions toward critical thinking among students is an important matter of concern (Shim & Walczak, 2012; Varelas, Wolfe, & Ialongo, 2015). Limbach and Waugh (2014) stated, "The challenges of the 21st century demand that educators seek out and utilize new methods to enhance the education of students where teachers empower learners to solve problems and think critically" (p. 95). When considering completion rate statistics at community colleges (AACC, 2015), the need for high quality critical thinking instruction becomes even more apparent. By providing research into the effects of two types of discussion strategies on the critical thinking dispositions of English Composition II students, the current study attempted to provide community college educators with specific tools to assist students in developing their academic skill sets and earning their associate degrees or certifications.

Chapter 2: Literature Review

Introduction

The current study compared the effects of small- versus whole-group discussion of higher-order questions on the critical thinking dispositions of students enrolled in two sections of a community college English Composition II course. This literature review focused on studies regarding critical thinking, active learning, classroom discussion, higher-order questions, English instruction, and the impact of student and instructor characteristics on critical thinking among postsecondary students. In addition, research studies on the relationships between specific instructional techniques, active learning strategies, and critical thinking were considered. To provide a well-rounded foundation for the current study, the researcher also included a review of the literature regarding the relationship between higher-order questions and critical thinking. Finally, the researcher concluded with an examination of the research regarding English instruction and critical thinking. Overall, the studies were synthesized in order to establish the current study's position within the body of literature on critical thinking, active learning, higher-order questions, and English instruction.

The Role of Critical Thinking and College Success

In order to establish the rationale for the current study's focus on college students' critical thinking, the literature review began with an examination of the relationships between critical thinking and indicators of success within the postsecondary environment. The review of recently published studies revealed a strong focus on research regarding the factors that impact the development of critical thinking within college students, as opposed to the impact that critical thinking has on college success; even fewer studies

addressed the impact of critical thinking dispositions on college success. However, a limited number of studies that investigated the relationship between critical thinking and postsecondary academic achievement were found and are discussed below.

One marker of student achievement that was investigated for its connection to critical thinking was course exams scores (Williams, Oliver, Allin, Winn, & Booher, 2003). Using a sample of 149 students from three sections of a university human development course, Williams, Oliver, Allin, Winn, and Booher (2003) examined whether pre- and post-test critical thinking measures were correlated to scores on five multiple choice unit exams and a final, end-of-course multiple choice exam designed to measure achievement of the learning objectives in the human development course. To measure students' critical thinking, the researchers used an instrument that presented 14 case scenarios in which faulty psychological conclusions were reached; the instrument was administered to individual students who were asked to analyze the scenarios and identify the weaknesses in the conclusions (Lawson, 1999, as cited in Williams et al., 2003). Evidence of critical thinking within the students' written responses on the instrument was assessed by graduate teaching assistants who achieved .91 interrater reliability for the pre-test and .92 reliability for the post-test (Williams et al., 2003). According to the researchers, students' course exam scores in the human development course were significantly correlated to both the pre-test critical thinking scores ($r = .41$, p <.01) and the post-test critical thinking scores ($r = .49$, p <.01). While these correlations are considered to be moderate, post-test critical thinking scores were significant predictors of exam scores (p <.001) and accounted for 26% of the variance in course exam scores (Williams et al., 2003).

Another standard used to measure college student success is pass-rates on professional licensure and certification exams. The relationship between critical thinking skills and dispositions to the pass-rates for one such exam, the National Council Licensure Examination for Registered Nurses (NCLEX-RN®), was the focus of Giddens and Gloeckner's (2005) study of 218 baccalaureate nursing students in the southwestern United States. To conduct the study, Giddens and Gloeckner employed the "nonexperimental ex-post-facto research approach" (p. 86) to analyze existing data gathered through the California Critical Thinking Skills Test (CCTST), the California Critical Thinking Disposition Inventory (CCTDI), and the NCLEX-RN® licensure exam (Giddens & Gloeckner, 2005, p. 87).   The CCTST was used to measure the following critical thinking skills: "analysis, evaluation, inference, inductive reasoning, and deductive reasoning" (Giddens & Gloeckner, 2005, p. 87). In addition, the CCTDI was used to measure the following critical thinking dispositions: "truth-seeking, inquisitiveness, open-mindedness, confidence, analyticity, systematicity, and maturity" (Giddens & Gloeckner, 2005, p. 87). Both the CCTST and the CCTDI were administered twice: at students' entry into the nursing program and during their last semester in the baccalaureate program (Giddens & Gloeckner, 2005). The students' entry and exit scores on the CCTST and the CCTDI were matched to their performance, defined as either pass or fail, on the NCLEX-RN® licensure exam (Giddens & Gloeckner, 2005). For purposes of analysis, the subjects were then divided into two groups: pass and fail (Giddens & Gloeckner, 2005).

An independent *t*-test revealed that students who passed the NCLEX-RN® had significantly higher entry scores on the overall CCTST ($p = .015$) compared to those

students who failed; moreover, the analysis subscale scores were significantly different between the two groups ($p = .017$), as were the deductive reasoning subscale scores ($p = .003$) (Giddens & Gloeckner, 2005). Furthermore, students who passed the NCLEX-RN® had significantly higher exit CCTST scores for all subscales than students who failed the NCLEX-RN® ($p < .05$) (Giddens & Gloeckner, 2005). With regard to the CCTDI measure of critical thinking dispositions, there was no significant difference in entry scores between students who passed the NCLEX-RN® and those who failed the NCLEX-RN® (Giddens & Gloeckner, 2005). However, students who passed the NCLEX-RN® had significantly higher exit CCTDI overall scores, as well as significantly higher scores on the following disposition subscales: truth-seeking, open-mindedness, systematicity, and maturity ($p < .05$) (Giddens & Gloeckner, 2005). Finally, discriminant analysis using exit CCTST and CCTDI scores and students' overall GPA resulted in the correct classification of 98% of the students who passed the NCLEX-RN®; however, using the same three variables, the discriminant analysis "incorrectly classified nearly 79% of those who failed" (Giddens & Gloeckner, 2005, p. 88). The researchers concluded that exit CCTST and CCTDI scores, combined with GPA, could serve as predictors of student success on the NCLEX-RN®, but not as predictors of student failure on the exam (Giddens & Gloeckner, 2005).

Giddens and Gloeckner (2005) did not provide the mean entry and exit CCTST and CCTDI scores for the NCLEX-RN® pass/fail groups. Therefore, after consultation with another researcher in the field of education (P. LeBlanc, personal communication, September 23, 2017), the researcher in the current study questions whether the entry CCTST/CCTDI scores influenced the exit scores that were used in the discriminant

analysis. Logically, students who entered the nursing program with higher critical thinking skills as measured by the CCTST would perform well on the NCLEX-RN® certification exam.

Interestingly, there were no significant differences in critical thinking dispositions, as measured by the CCTDI, between students who passed the NCLEX-RN® and those who failed the exam (Giddens & Gloeckner, 2005). However, the researchers did find a significant difference in the exit CCTDI scores between students who passed the NCLEX-RN® and those who failed the test (Giddens & Gloeckner, 2005). As asserted by the Delphi panel experts (Facione, 1990), as well as several critical thinking experts (Halpern, 1999), the disposition to use critical thinking skills is just as important as the possession of the skills themselves. One might even conjecture that this disposition towards using critical thinking is even more important in medical professions, such as nursing, in which professionals are required to make daily decisions that affect patients' well-being. Accordingly, Giddens and Gloeckner's (2005) study points to the need for further investigation into the relationship between students' critical thinking dispositions and the skills that help them to pass the NCLEX-RN® licensure exam.

Student Characteristics and Critical Thinking

As previously discussed, while some studies investigated the relationship between critical thinking and college success indicators, most of the current researcher's literature review resulted in studies that focused on the factors that relate to increased critical thinking among college students. In general, critical thinking research demonstrated different emphases over time. Some of the researchers focused on the relationship between students' characteristics and demonstration of critical thinking (Magno, 2010;

Laird et al., 2014; Williams & Lahman, 2011). For example, using a sample of 240

students from several universities within the Philippines' National Capital Region,

Magno (2010) investigated whether students' metacognition, defined as "the ability to

control one's knowledge and thinking processes" (p. 138), was a predictor of critical

thinking. To measure students' metacognition, Magno used Schraw and Dennison's

(1994) Metacognitive Assessment Inventory (MAI), which consisted of 52 items

measuring students' knowledge of cognition (including the three factors of declarative,

procedural, and conditional knowledge) and regulation of cognition, which included the

five factors of planning, managing information, monitoring thinking, debugging when

problems arise, and evaluating (Magno, 2010). To measure students' critical thinking,

Magno also used the Watson-Glaser Critical Thinking Appraisal (WGCTA), which

contained 50 items assessing the five factors of inference, recognition of assumptions,

deduction, interpretations, and evaluation of arguments.

To analyze the data, Magno (2010) performed a zero-order correlation that

revealed significant correlations between the eight factors of metacognition and the five

factors of critical thinking ($p < .05$). According to Magno, the strength of the correlations

was moderate, with r values ranging from .21 to .58. Furthermore, the relationships

among the factors were positively skewed, indicating that "the use of metacognition

factors increases with the scores on the factors of critical thinking" (Magno, 2010, p.

145). Based on his findings, Magno concluded that there was a significant relationship

between the factors involved in metacognition and those involved in critical thinking.

Unlike Magno's focus on students' metacognition and critical thinking, Williams

and Lahman (2011) examined the relationships between critical thinking and students'

demographic characteristics. Using a sample of 17 lower-level and 25 upper-level

undergraduates enrolled in a general education course, the researchers conducted a

content analysis of 361 discussion forum postings to investigate the relationships between

course level, GPA, and gender on student demonstrations of critical thinking and levels

of interaction within "computer-mediated communication (CMC)" (Williams & Lahman,

2011, p. 144). To code the data, Williams and Lahman operationalized level of

interaction and critical thinking by combining the methods of other researchers in the

field of CMC with their own "intuitive criteria concerning interaction and critical

thinking" (p. 150). Accordingly, the authors identified three dimensions of interaction:

asking questions, making referential statements in response to other students, and posting

engaging statements that connect to the discussion (Williams & Lahman, 2011). Critical

thinking dimensions included making assertions, justifying assertions, using outside

knowledge, and demonstrating understanding by putting problems "in perspective" (p.

150).

Analysis of the frequency data from the individual coded statements revealed

little or no relationship between critical thinking and course level, GPA, or gender

(Williams & Lahman, 2011). Furthermore, a cross-tabulation of statements coded

according to either critical thinking or level of interaction revealed no significant

relationship between the two variables (Williams & Lahman, 2011). Further analysis

included the examination of groups of discussion posts on a case-by-case basis, as

opposed to looking at individual statements, to determine whether the statements within

each case exceeded the mean number of instances for each variable (Williams & Lahman,

2011). The authors found that by analyzing these "groups of cases" (p. 157), a strong

relationship between level of interaction and critical thinking ($p < .01$) was revealed

(Williams & Lahman, 2011). According to the authors, the students demonstrating

higher levels of interactions within their discussion posts "tend to be the students

exhibiting high levels of critical thinking" (p. 158). Although Williams and Lahman's

(2011) study focused on online discussions among students, their findings add support to

the current researcher's position, based on Vygotsky's social constructivist theory

(Powell & Kalina, 2009), that the use of language within classroom discussions, whether

online or face-to-face, can have an impact on students' critical thinking.

While Williams and Lahman (2011) examined general student characteristics

such as gender and GPA, Laird et al. (2014) investigated the impact of a behavioral

process known as "deep approaches to learning (DAL)" (p. 403) on first-year college

students' critical thinking, predisposition towards inquiry (also known as "need for

cognition" p. 407), and "positive attitudes toward literacy (PATL)" (p. 407). Laird et al.

measured DAL, which they defined as the ability to focus on key concepts and to transfer

ideas to new settings, using a researcher-created instrument based on the National Survey

of Student Engagement (NSSE). The instrument consisted of an overall scale and three

subscales: the Higher-Order Learning Scale, which assessed students' perceptions

regarding the level of "advanced thinking skills" (p. 414) necessary for their courses; the

Integrative Learning Scale, which assessed the level of students' participation in activities

that required the integration of ideas from different sources; and the Reflective Learning

Scale, which measured students' tendencies to reflect on "the strengths and weaknesses

of their own views" (p. 414).

The researchers correlated the DAL data with students' scores on the Critical Thinking Test section of the Collegiate Assessment of Academic Proficiency (American College Testing Program, 1991, as cited in Laird et al., 2014), the Need for Cognition Scale (Cacioppo et al., 1996, as cited in Laird et al., 2014), and the Positive Attitude Toward Literacy Scale (Bray et al., 2004, as cited in Laird et al., 2014). The partial correlations between the DAL overall scale and the end-of-first-year Need for Cognition and Positive Attitude Toward Literacy scores were significant ($p < 0.001$); however, the partial correlation between the DAL overall scale and the end-of-first-year Critical Thinking Test was not significant ($p > 0.05$) (Laird et al., 2014). The partial correlations between all three DAL subscales (Higher-order, Integrative, and Reflective Learning) and the end-of-first-year Need for Cognition and Positive Attitude Toward Literacy scores were significant ($p < 0.001$) (Laird et al., 2014). However, end-of-first-year Critical Thinking Test scores were significantly correlated with only one of the three DAL subscales: Reflective Learning ($p < 0.01$) (Laird et al., 2014).

Laird et al.'s (2014) findings regarding the relationships between the three DAL subscales and students' Critical Thinking Test scores have important instructional implications. Although Laird et al. found no significant correlation between the DAL Higher-Order Learning subscale that measured students' perceptions of the level of higher-order thinking required to be successful and students' Critical Thinking Test scores, the researchers did find a correlation between the students' critical thinking scores and the Reflective Learning DAL subscale, which measured students' willingness to reflect on the strengths of their own arguments (Laird et al., 2014). These results suggest that, in the case of critical thinking, students' actual behaviors, such as reflecting on the

validity of one's arguments, may be more beneficial than students' perceptions of their activities within the classroom. Laird et al.'s (2014) findings on the relationship between reflection and critical thinking also reinforce Paul and Elder's (1996) argument that, in order to grow as a critical thinker, individuals must engage in regular self-assessment.

Instructor Characteristics/Methods and Critical Thinking

In addition to the research on student characteristics, a recent study was conducted to examine the links between instructor characteristics and students' development of critical thinking (Belcher, Hall, Kelley, & Pressey, 2015). In their study, Belcher et al. (2015) investigated the effect of instructors' behaviors on students' demonstrations of critical thinking within the online discussion forums of both undergraduate and graduate College of Education courses at one institution (Belcher et al., 2015). Belcher et al. reviewed the discussion forum transcripts of 91 online courses and created a list of 12 online instructor behaviors that they labeled as positive: (1) challenging students to think; (2) communicating to "student's subject" (p. 41); (3) suggesting additional resources; (4) providing "genuine" (p. 41) compliments; (5) providing follow-up to students' comments; (6) summarizing students' comments; (7) directing students to another post; (8) addressing more than just the "individual student's comment" (p. 41); (9) sharing personal or professional experiences; (10) responding "more than once per week" (p. 41); (11) using "two or more strategies" (p. 41); and, (12) citing non-course material. The researchers also listed seven online instructor behaviors that they deemed negative: (1) failing to respond to all students; (2) providing the same responses; (3) asking closed-ended questions; (4) providing limited responses; (5) failing

to follow up to a "second level" (p. 41); (6) failing to relate responses to posts; and, (7) using one or fewer strategies.

Quantitative data on the students' levels of peer interaction within the discussion forum responses were compiled by coding the transcripts according to Gunawardena, Anderson, and Lowe's (1997) Interaction Analysis Model (IAM) (as cited in Belcher et al., 2015). The IAM measures "co-construction of knowledge among peers" (p. 40) across five phases: "(1) sharing and comparing, (2) dissonance, (3) negotiation and co-construction, (4) testing tentative constructions, and (5) statement and application of newly constructed knowledge" (Belcher et al., 2015, p. 40). According to Belcher et al., the IAM, which assesses knowledge construction, can be applied to critical thinking, which is "a component of knowledge construction" (p. 41).

In all, the researchers coded 19,595 student postings using IAM; when combined with the instructor behaviors, a total of 352,710 data points were subsequently correlated using SPSS (Belcher et al., 2015). The results of the analyses indicated that four positive instructor behaviors had weak, but significant, correlations with IAM scores: "communicates directly to the student's subject ($r = 0.035$, $p < 0.01$); genuinely compliments the student's posts ($r = 0.018$, $p < 0.05$); summarizes the student's posts ($r = 0.028$, $p < 0.01$); and responds more than once per week to the student ($r = 0.02$, $p < 0.01$)" (Belcher et al., 2015, p. 41). Interestingly, two instructor behaviors that had been labeled by the researchers as negative also had significant, albeit weak, correlations with IAM scores: "responses were very limited ($r = 0.019$, $p < 0.01$) and lack of follow up to second level ($r = 0.029$, $p < 0.01$)" (p. 41). According to the researchers, the study's results suggest that instructors' behaviors had a "mild impact" (p. 41) on students'

demonstrations of critical thinking within online discussion forums. The study's findings suggest that even negative instructor behaviors within a discussion forum can impact students' critical thinking by causing them to "consciously or unconsciously" (p. 41) increase their engagement with classmates when they realize their "instructor is less engaged" (p. 41).

Belcher et al.'s (2015) results have significant implications for instruction when considered in the context of Vygotsky's theories on the importance of social interaction (Powell & Kalina, 2009). According to Vygotsky, the support necessary for students to construct knowledge and to grow as learners comes from their interactions with teachers and peers (Powell & Kalina, 2009). However, as suggested in Belcher et al.'s (2015) study, peer support may make up for deficits in teacher support. This finding adds emphasis to the current researcher's focus on the impact of classroom discussion of higher-order questions and students' critical thinking dispositions.

Instructional Techniques and Critical Thinking

While the previously mentioned researchers focused on the impact of student and instructor characteristics on critical thinking, other researchers concentrated on pedagogy by examining the relationships between instruction and critical thinking. Some of these research studies focused on the effects of direct instruction in critical thinking, as opposed to critical thinking instruction that occurred implicitly as students interacted with course content (Heijltjes, Gog, Leppink, & Paas, 2015; Heijltjes, Gog, & Paas, 2014; Ku, Ho, Hau, and Lai, 2014). For example, using six three-hour training sessions that were conducted over two weeks, Ku, Ho, Hau, and Lai (2014) assigned a sample of 651 Chinese Grade 12 students to one of the following three treatment conditions: (1) "direct

instruction predominant" (p. 256), in which students received four direct instruction lessons on critical thinking skills, followed by two inquiry-based group sessions related to real-world scenarios; (2) "balanced mode" (p. 256), in which students participated in three direct instruction lessons on critical thinking skills, followed by three inquiry-based sessions; and, (3) "inquiry predominant" (p. 256), in which students participated in four sessions of inquiry-based instruction, followed by two direct instruction lessons on critical thinking skills. Eighty-five subjects were assigned to a control group and did not receive any critical thinking skills instruction (Ku et al., 2014).

Ku, Ho, Hau, and Lai (2014) conducted pre- and post-test assessments of the subjects' critical thinking skills by administering two standardized measures of critical thinking: the Chinese version of the Halpern Critical Thinking Assessment Using Everyday Situations (HCTAES), which included both open and closed-ended questions, and the Watson-Glaser Critical Thinking Appraisal (WGCTA). In addition, the authors gathered pre- and post-test data on the students' critical thinking dispositions by administering the "Chinese version of the revised need for cognition scale-short form (NCS-SF)" (Ku et al., 2014, p. 258). Using a Likert scale, the NCS-SF measures students' tendencies to participate in activities requiring cognitive effort, as well as their "enjoyment of such activities" (p. 258). Ku et al. also assessed students' critical thinking dispositions with two subscales of the NEO five-factor inventory (Costa & McCrae, 1992, as cited in Ku et al., 2014): the openness to experience subscale, which measures the flexibility of students' attitudes and values, and the conscientiousness subscale, which measures students' precision in managing tasks.

Hierarchical regression analyses of the HCTAES scores indicated that all three experimental conditions were significantly related to students' critical thinking skills: direct instruction predominant ($b = .18$, $p < .01$), balanced mode ($b = .11$, $p < .05$), and inquiry predominant ($b = .23$, $p < .001$) (Ku et al., 2014). However, regression analyses of the WGCTA data revealed that only the balanced mode was significantly correlated to students' critical thinking ($b = .12$, $p < .05$) (Ku et al., 2014). Separate regression analyses of critical thinking dispositions indicated that the direct instruction-predominant model ($b = .09$, $p < .05$) and the balanced model ($b = .08$, $p < .05$) were significantly related to need for cognition, whereas the balanced model ($b = .11$, $p < .01$) and the inquiry-predominant model ($b = .08$, $p < .05$) were significantly related to openness (Ku et al., 2014). According to the researchers, the findings pointed to the benefits of using more than one instructional method when teaching critical thinking (Ku et al., 2014). Ku et al.'s (2014) conclusions regarding the value of employing several instructional methods lends support to the current researcher's use of four small-group discussion strategies to compare the impact of small- versus whole-group discussion on students' critical thinking dispositions.

The differences between direct and indirect instruction were also the focus of research by Heijltjes, Gog, and Paas (2014), who studied 141 collegiate economics students to compare the effects of direct critical thinking instruction to the effects of instruction in critical thinking that occurs implicitly through the delivery of course content. The researchers randomly assigned students to one of the following five treatment conditions: (1) implicit critical thinking instruction through business cases involving argument and negotiation; (2) the same implicit instruction accompanied by a

practice video; (3) the implicit instruction and practice accompanied by explicit

instruction; (4) the implicit and explicit instruction combined with practice and prompts

for self-explanation; and, (5) the implicit and explicit instruction combined with practice,

self-explanation, and "activation prompts" (p. 521) designed to draw students' attention

to information that was relevant, but not obvious (Heijltjes, Gog, & Paas, 2014).

Heijltjes et al. (2014) utilized pre- and post-test measures of the students' critical

thinking, which they defined as "unbiased reasoning" (p. 521), as measured by a

researcher-created, 16-item reasoning assessment. Analysis of covariance revealed a

significant effect for the instructional condition on post-test scores ($p < .001$). Students

in the treatment conditions that included explicit critical thinking instruction (conditions

3, 4, and 5) had significantly higher post-test scores on the reasoning measure than

students in the treatments without explicit instruction (conditions 1 and 2); the

researchers stated that all p values were less than .002 (p. 525), indicating strong effects

on critical thinking for subjects in the treatment conditions that included explicit critical

thinking instruction.

A similar study that also examined the effects of explicit critical thinking

instruction was conducted by Heijltjes, Gog, Leppink, and Paas in 2015. The researchers

assigned 152 economics students to one of the following six treatment conditions: (1) use

of a critical thinking instructional text that explained the reasoning process; (2) use of the

text and critical thinking practice involving a business case from the economics course;

(3) the critical thinking text and critical thinking practice accompanied by self-

explanation prompts that required students to explain how they developed answers to

questions; (4) use of an unrelated text (a newspaper article that was the same length as the

critical thinking text); (5) use of the unrelated text with critical thinking practice; and, (6) use of the unrelated text, critical thinking practice, and self-explanation prompts (Heijltjes, Gog, Leppink, & Paas, 2015). The students' critical thinking was measured by a researcher-created instrument consisting of eight reasoning items (Heijltjes et al., 2015).

Heijltjes et al. (2015) analyzed the pre- and post-test scores of the critical thinking instrument through multivariate analysis, which revealed a statistically significant effect for the instructional condition ($p < 0.001$) (Heijltjes et al, 2015). In addition, ANOVA revealed that students who participated in treatments involving explicit critical thinking instruction on trained tasks (conditions 1, 2, and 3) had higher within-group "difference scores (post-test minus pre-test)" (p. 496) than students who received the treatments without explicit critical thinking instruction on trained tasks (conditions 4, 5, and 6) ($p < 0.001$) (Heijltjes et al., 2015). The research on direct versus implicit critical thinking skills instruction (Heijltjes, Gog, Leppink, & Paas, 2015; Heijltjes, Gog, & Paas, 2014) suggests that college students reap the greatest benefit when participating in direct instruction of critical thinking skills, rather than simply engaging in classroom activities that allow for practice in critical thinking. These findings also provide additional support for Paul and Elder's (1997) assertions regarding the need for explicit critical thinking instruction to enable students to progress through the developmental stages of critical thinking.

In the previously-mentioned research studies (Heijltjes, Gog, Leppink, & Paas, 2015; Heijltjes, Gog, & Paas, 2014; Ku, Ho, Hau, and Lai, 2014), the authors focused on the effects of direct versus implicit instruction in critical thinking; in contrast, other researchers concentrated solely on direct instruction by examining the relationship

between specific teaching methods and critical thinking. Saiz, Rivas, and Olivares (2015) investigated whether integrating rubrics and increasing student participation in their university's "ARDESOS" (p. 10) critical thinking instructional program would affect students' critical thinking skills. The authors studied a sample of 144 undergraduate psychology students during a 15-week term; part of the sample participated in instruction with the first version of the critical thinking program, "ARDESOS v.1" (p. 10), while the other part of the sample participated in "ARDESOS v.2" (p. 10), which had been revised to include rubrics and greater student participation. As a pre-test and post-test measure in both groups, the authors administered a researcher-created instrument, the 35-item PENCRISAL Critical Thinking Test (Saiz et al., 2015), which measured five indicators of critical thinking: Practical Reasoning, Deduction, Induction, Decision Making, and Problem Solving (Saiz et al., 2015). The authors calculated the within-group mean difference scores between pre-test and post-test for both groups; analysis of comparisons of the two groups revealed a significant difference ($p < .01$) between the mean difference scores of the ARDESOS version 1 program and the ARDESOS version 2 program on the overall PENCRISAL and on all subscales except decision making (Saiz, Rivas, & Olivares, 2015). The authors concluded that subjects in the ARDESOS version 2 program, which had the addition of rubrics and more active learning, demonstrated "significantly better performance" (p. 16) than subjects in the ARDESOS version 1 program (Saiz, Rivas, & Olivares, 2015). However, the researchers did not control for the influence of the use of rubrics compared to the influence of increased active learning.

Another instructional method investigated to determine its effect on critical thinking was the use of primary source documents in place of a textbook during a semester-long undergraduate psychology course (D. Van Camp & W. Van Camp, 2013). Each week, students were assigned a primary source document, as well as five questions related to the readings (D. Van Camp & W. Van Camp, 2013). To collect pre-test and post-test data, the students were given a researcher-created critical reading skills test (D. Van Camp & W. Van Camp, 2013). Analysis of the resulting data revealed a significant improvement in the students' ability to read critically during the semester ($p < .001$) (D. Van Camp & W. Van Camp, 2013). However, several limitations to the study were observed by the current researcher, such as a small sample size ($n = 30$), a lack of comparison group, and the fact that all of the participants were female (D. Van Camp & W. Van Camp, 2013).

Whereas D. Van Camp and W. Van Camp (2013) focused on the link between reading and critical thinking, Franklin, Weinberg, and Reifler (2014) examined the effects of a specific writing instructional technique on the critical thinking skills and writing performance of undergraduate students enrolled in three sections of an introductory government course. The technique, termed "skeleton essays" (p. 157), guided students through the writing process by providing prompts for various essay components, such as creating a hypothesis and providing supporting evidence; students were asked to address each prompt with no more than two sentences (Franklin, et al., 2014). The researchers investigated whether testing students using a combination of skeleton essays and multiple choice items would have greater benefits for students' critical thinking and writing skills than either a multiple choice format or multiple choice

questions combined with a "standard (full) essay" (Franklin, et al., 2014, p. 157). Each of the three sections of the government course was given a different testing format during the administration of two course exams (Franklin, et al., 2014). However, all three sections received the combined multiple choice/traditional essay format for the final exam, which was used as the post-test instrument (Franklin, et al., 2014).

The final exams, which served as the post-test, were graded with a seven-point rubric that measured the critical thinking skills of hypothesizing, using supporting evidence, anticipating counterarguments, and understanding the implications of arguments; in addition, the rubric measured course-specific skills such as accuracy of content, understanding the relationship between government institutions, and understanding the "relationship of American government to the external context" (Franklin, et al., 2014, p. 158). Upon analyzing the students' final exam scores, the researchers found that students who had taken the two combined multiple choice/skeleton essay course exams scored lower on the final exam than students in the other two sections; however, this difference in final exam scores was not significant (Franklin, et al., 2014). According to the researchers, the results suggested that "the skeleton essay approach in large classes does not provide any significant benefit over full writing assignments or even a lack of writing assignments – prior to the final exam" (Franklin, et al., 2014, p. 161).

Rickles, Schneider, Slusser, Williams, and Zipp (2013) also investigated the relationship between an instructional technique involving writing and students' level of critical thinking. To conduct the study, the authors used four sections of an introductory sociology course offered at a public university (Rickles et al., 2013). Two sections,

which served as the experimental group ($n = 35$), were given two writing assignments

that had been specifically designed to include a critical thinking component (Rickles et

al., 2013). One of these assignments involved students' perceptions of the manner by

which mass media impact females' self-esteem; the other writing assignment involved

students' perceptions of neighborhood criminal activity (Rickles et al., 2013). Each of

these assignments was followed by in-class whole-group discussions (Rickles et al.,

2013). In contrast, the control group ($n = 66$) received written assignments that lacked

"any conscious 'critical thinking' component" (p. 275). Data were collected from both

the experimental and control groups through the administration of pre- and post-test

essays (Rickles et al., 2013). Afterwards, the essays were analyzed using Biggs and

Collis' (1982) Structure of the Observed Learning Outcomes (SOLO) taxonomy (as cited

in Rickles et al., 2013). The SOLO taxonomy assessed students' level of critical thinking

as measured by the following indicators: (1) ability to understand a problem; (2) ability to

form an argument by synthesizing and prioritizing information; (3) ability to identify

relevant details when answering a question; and, (4) ability to use "outside information"

(p. 275) to support an argument (Rickles et al., 2013).

A t-test of independent samples revealed no significant difference in post-test

SOLO scores between the experimental and control groups (Rickles et al., 2013).

However, regression analysis revealed a significant relationship ($p < .05$) between post-

test SOLO scores among the experimental group that participated in the explicit critical

thinking component of instruction (Rickles et al., 2013). In discussing the results of the

regression analysis, the researchers commented that they were not able to determine

whether the critical thinking essays, the discussion of the essays, or an interaction of the

two variables impacted the subjects' post-test SOLO critical thinking scores (Rickles et al., 2013). Based on the tenets of social constructivism (Powell & Kalina, 2009), which stress the importance of social interaction in the construction of knowledge, the current researcher postulates that discussing the essays had an impact on the experimental group's demonstration of critical thinking (Rickles et al., 2013). Further research is warranted to parse out the effects of the critical thinking essays versus the discussion of the essays (Rickles et al., 2013) with regard to the students' critical thinking development.

The interaction of different variables and critical thinking was also the focus of a research study by Howard, Tang, and Austin (2015). Using a sample of 659 undergraduate business students randomly assigned to four groups, the researchers examined the interaction effects of a critical thinking case study intervention and pre-test on students' post-test critical thinking scores (Howard et al., 2015). To conduct the study, groups one and two were given the Watson-Glaser Critical Thinking Appraisal (WGCTA) pre- and post-tests; groups three and four were given the WGCTA as a post-test only (Howard et al., 2015). Only groups one and three received the intervention, which consisted of case study reports that required students to identify critical issues in a business case to determine alternative solutions (Howard et al., 2015).

A 2X2 ANOVA revealed no significant main effect for the intervention, the pre-test, or the pre-test plus intervention (Howard et al., 2015). A one-way ANOVA revealed no significant differences in post-test scores between the four groups. Interestingly, a within-groups paired-samples *t*-test combining data from groups one and two, which had both received the pre- and post-tests, revealed a significant increase in post-test scores (*p*

46

= .001) (Howard et al., 2015). When the data were analyzed separately, within group comparisons of group one, which had received the pre-test/post-test and the intervention, and group two, which had received just the pre-test/post-test, showed significant increases in post-test scores (Howard et al., 2015). Howard et al.'s findings point to the need for further research to clarify which factors had the greater impact on students' critical thinking: the pre-test or the intervention.

Shim and Walczak (2012) expanded the body of research on instructional interventions and critical thinking by investigating tasks that had the greatest impact on critical thinking from the student's point-of-view. The authors used the data from the Wabash National Study of Liberal Arts Education (WNS) of 4,501 students from 19 two-year and four-year colleges and universities (Shim & Walczak, 2012). Shim and Walczak also analyzed data from the WNS Student Experiences Survey (WSES), the National Survey of Student Engagement (NSSE), and the Collegiate Assessment of Academic Proficiency (CAAP). The authors excluded from analysis the students who attended two-year colleges, as well as students with missing data; as a result, the final sample size was 1,181 students from 17 universities (Shim & Walczak, 2012).

Using the WNS and NSSE, Shim and Walczak (2012) compiled data on students' opinions of a number of instructional practices, such as providing written feedback, asking challenging questions, and requiring students to defend their viewpoints. The data were subsequently correlated by the researchers to students' self-reported critical thinking growth on the WNS, as well as their scores from CAAP's critical thinking section (Shim & Walczak, 2012). The results of an ordinary least squares regression analysis revealed a significant relationship ($p < .001$) between instructors' use of challenging questions and

critical thinking as measured by the CAAP (Shim & Walczak, 2012). Shim and

Walczak's (2012) finding regarding the benefits of instructors' questions adds support to

the social constructivist view that students are able to progress in their learning with the

support of their teachers and peers (Powell & Kalina, 2009).

Active Learning and Critical Thinking

Like Shim and Walczak (2012), many researchers in the field of critical thinking

and education focused on the impact of instructional methods on students' critical

thinking development. An instructional method that received particular attention was the

use of active learning strategies, which encourage students to play a direct role in their

educational tasks (Petress, 2008). The recent literature on one active learning strategy in

particular, discussion, has direct relevance to the current study. As explained by

Dallimore, Hertenstein, and Platt (2008), "class discussion is active and linked to the

development of critical thinking and problem solving" (p. 163). Additionally, as opposed

to lecture, class discussion promotes reflective thinking and retention of information

(Dallimore et al., 2008).

Dallimore, Hertenstein, and Platt (2008) investigated the influence of whole-

group discussion, as operationalized by a graded participation requirement (40% of the

total grade) and "cold-calling" (p. 163) of students who did not raise their hands to

participate, on students' self-reports of "oral and/or written communication-skill

development" (p. 163). The research was conducted in a second-term MBA managerial

accounting course that encouraged critical thinking through the oral and written analyses

of management case studies (Dallimore et al., 2008). Through oral directions on the first

day of class and the course syllabus, which explained that students' participation grade

would be based on the quality of their contributions to class discussions, the instructor encouraged students to prepare for class discussions prior to class (Dallimore et al., 2008). However, the researchers did not elaborate on whether students were given specific directions on how to prepare for these discussions before class (Dallimore et al., 2008).

On the first day of class, the researchers administered a questionnaire to the students ($n = 54$) that used a 7-point Likert scale to gather baseline data on the students' perceptions and behaviors regarding class discussion (Dallimore et al., 2008). A second questionnaire used a 7-point Likert scale to gather data on students' "participation frequency, preparation, comfort, and perceived communication skill development" (p. 166); this instrument was administered on the last day of the course (Dallimore et al., 2008). To protect student confidentiality, PIN numbers were used in lieu of names on the questionnaires; unfortunately, many students forgot their PINs between the first and second administrations of the questionnaire, resulting in a final sample of 27 questionnaires (Dallimore et al., 2008).

The researchers used correlation analyses to determine the relationship between before-class preparation and participation in classroom discussions and students' self-reports of oral and written communication development (Dallimore et al., 2008). The analyses revealed a significant positive relationship between students' pre-class preparation for discussion and students' perceived gains in oral communication skills ($r = .408, p = .035$) (Dallimore et al., 2008). In addition, the analyses revealed a significant positive relationship between frequency of students' participation in class discussion and students' perceived gains in oral communication skills ($r = .539, p = .004$) (Dallimore et

al., 2008). With regard to students' perceived gains in written communication skills, the analyses revealed positive significant relationships between students' pre-class preparation for discussion (r = .455, p = .017) and frequency of students' participation in class discussion (r = .484, p = .011) (Dallimore et al., 2008).

Dallimore et al.'s (2008) findings regarding the relationships between preparation for discussion and students' perceived achievements in both oral and written communication skills present an interesting topic for future research. Social constructivist theories point to the relationship between the use of language when interacting with peers and students' acquisition of knowledge (Powell & Kalina, 2009). However, Dalimore et al.'s (2008) findings suggest that advance preparation for these social interactions can also influence oral and written skill development. Future research is warranted to parse out Dallimore et al.'s findings to determine the influence of advance preparation for class discussions on students' knowledge construction. In extending Dallimore et al.'s research on discussion and knowledge acquisition, future studies should also examine the influence of graded participation and "cold calling" (p. 163) of students when their hands are not raised to indicate readiness to discuss.

Pollock, Hamann, and Wilson, (2011) expanded the research on class discussion among postsecondary students by comparing students' perceptions of the benefits of small-group versus whole-class discussion. The study was conducted in an upper-level political theory class (n = 53) that incorporated two whole-group discussion sessions based on assigned class readings and two small-group discussion sessions consisting of groups of five students (Pollock et al., 2011). In the first small-group discussion activity, students were given a freedom of speech case study to evaluate based on John Stuart

Mill's *On Liberty*; for the second small-group activity, students were asked to discuss an article on democracy and capitalism (Pollock et al., 2011).

Data were collected through questionnaires that were administered to students after the discussion sessions (Pollock et al., 2011). Using differing three-point scales, the questionnaires gathered self-reported data by students on the relationships between small- and whole-group discussion and the following student characteristics: level of participation, ability to express thoughts, knowledge of peers, reconsideration of values, understanding of issues, application of issues, tendency to raise questions, level of interest, and overall satisfaction (Pollock et al., 2011). Frequency data were compiled from a total of 67 questionnaires from the two whole-class discussions and 79 questionnaires from the two small-group discussions (Pollock et al., 2011). The analyses revealed that 70.9% of the small-group questionnaires recorded the highest level of student overall satisfaction as measured on the three-point scale, compared to 53.7% of the whole-class discussion questionnaires (Pollock et al., 2011). Further frequency analyses of the questionnaires with regard to the highest responses on the three-point scales favored small-group discussion over whole-class discussion in the following student variables: level of participation (33% for small-group versus 24% for whole-class), ability to express thoughts (53% compared to 45%), knowledge of peers (42% compared to 30%), understanding of issues (56% compared to 54%), application of issues (46% compared to 27%), tendency to raise questions (53% compared to 36%), and level of interest (60% compared to 49%) (Pollock et al., 2011). Interestingly, for the reconsideration of values variable, the whole-class discussion questionnaires revealed a larger number of the highest responses on the three-point scale compared to the small-

group frequency of highest response: 24% versus 22%, respectively (Pollock et al., 2011). According to the researchers, the difference in high scores on the reconsideration of values variable favoring whole-class discussion may have been due to the fact that, in the whole-group discussion setting, students were exposed to a wider range of viewpoints (Pollock et al., 2011).

In measuring students' perceptions of the eight behaviors, as well as students' overall satisfaction with small- versus whole-group discussion, three-point scales with different response choices were used (Pollock et al., 2011). For example, the item measuring students' perceptions regarding their ability to express their thoughts presented students with the following three choices: not at all, to some degree, and very well (Pollock et al., 2011). In contrast, the item measuring students' ability to understand issues was presented to students using the following three choices: not at all, somewhat, a lot (Pollock et al., 2011). One may posit that the differing response scales (Pollock et al., 2011) may have influenced the comparability of the frequency data.

Nevertheless, Pollock et al.'s (2011) findings provide important insights to instructors wishing to include discussion as part of an active learning pedagogy designed to increase students' critical thinking dispositions. The frequency data suggest that small-group discussion may have an impact on students' perceptions of their ability to express thoughts and raise questions (Pollock et al., 2011), two skills that are related to the critical thinking disposition of systematicity, or the ability to approach problems in a disciplined, orderly fashion (Insight Assessment, 2017). Conversely, Pollock et al.'s findings suggest that whole-group discussion has an impact on students' willingness to reconsider their values, a characteristic that is related to the critical thinking disposition

of truth-seeking (Insight Assessment, 2017). Pollock et al.'s findings suggest that students' perceptions of their critical thinking dispositions can be impacted by a combination of small-group and whole-group instruction.

Whereas Pollock et al. (2011) focused on discussion, Kim, Sharma, Land, and Furlong (2013) investigated the effects of a different type of active learning pedagogy on students' critical thinking. The researchers used a geoscience course from a university in the northeastern U.S. to investigate whether undergraduate students ($n = 105$) who engaged in two small-group, collaborative learning modules that required them to address real-world natural disasters would experience a change in their critical thinking (Kim et al., 2013). Throughout the two modules, which focused on a hurricane scenario and the results of global warming, the students participated in the three active learning strategies: problem-solving in small groups, engaging in authentic tasks, and scaffolding (Kim et al., 2013). Pre-test and post-test data consisted of students' written reports from the modules, which were analyzed by two raters who applied a researcher-created "coding scheme for critical thinking" (p. 228). The coding scheme measured students' ability to identify problems, evaluate decisions, develop a perspective, and communicate effectively (Kim et al., 2013). Before coding, the raters' inter-rater reliability was established at .97 (Kim et al., 2013). A paired *t*-test revealed a significant gain ($p = .001$) in mean percentage scores between the first report on the hurricane module, which served as the pre-test, and the second report on global warming, which served as the post-test (Kim et al., 2013).

Kim et al.'s study (2013) lacked a control group, thus limiting the generalizability of the study's findings. However, the increase in mean percentage scores from pre- to post-test (Kim et al., 2013) suggests the benefits of social interaction with peers (Powell

& Kalina, 2009) while engaging in real-world scenarios. The natural disaster learning modules used in the study can be viewed as an example of problem-based learning (PBL), a form of active learning in which "complex, real-world problems are used to motivate students to identify and research the concepts and principles they need to know to work through those problems" (Duch, Groh, & Allen, 2001).

Problem-based learning (PBL) was also the focus of Tiwari, Lai, So, and Yuen's (2006) longitudinal study of 79 students enrolled in a four-year nursing program at a university in Hong Kong. The purpose of the study was to investigate the effects of PBL versus lecturing on the nursing students' critical thinking dispositions (Tiwari et al., 2006). At the beginning of the first semester, the researchers administered the California Critical Thinking Disposition Inventory (CCTDI) to all 79 students as a pre-test measure of their critical thinking dispositions (Tiwari et al., 2006). Using a 75-item Likert scale, the CCTDI provided an overall score and the following seven subscales: "Truthseeking, Open-mindedness, Analyticity, Systematicity, Critical Thinking Self-confidence, Inquisitiveness, and Cognitive Maturity" (p. 548). Following the administration of the CCTDI, the researchers randomly assigned 40 students to a two-semester nursing therapeutics course in which students participated in three to six hours of PBL tutorial sessions for 28 weeks (Tiwari et al., 2006). During the course, the students, working in groups of 10, analyzed and generated hypotheses about cases based on actual patients; they also synthesized information and applied the information to solving problems presented in the cases (Tiwari et al., 2006). As a control, 39 students were randomly assigned to a two-semester nursing therapeutics course in which lecturing was used as the instructional approach (Tiwari et al., 2006). As with the PBL group, the lecture group

met for 28 weeks and had the same course objectives (Tiwari et al., 2006).   After the

nursing therapeutics course was completed, all 79 students "underwent the same

educational experience for the remaining 3 years of the programme" (p. 549).

Furthermore, the students did not participate in PBL during the remainder of their

program (Tiwari et al., 2006).

To gather data on the longitudinal effects of the PBL intervention, the CCTDI was

administered at three more points during the students' program: at the end of the second

semester (following the nursing therapeutics course), at the end of the students' first year,

and at the end of the students' second year (Tiwari et al., 2006). The researchers used a

two-sample t-test to determine whether there was a significant difference "in the change

of the scores" (p. 550) for the PBL and lecture groups between the various CCTDI

administrations (Tiwari et al., 2006). There were no significant differences in the CCTDI

scores between the PBL and lecture groups on the pre-test (Tiwari et al., 2006).

However, from the first CCTDI administration (pre-test) to the second administration at

the end of the second semester (following the PBL treatment), the PBL group

demonstrated "significantly greater improvement" (p. 547) than the lecture group on

overall scores ($p = 0.0048$), and on Truthseeking ($p = 0.0008$), Critical Thinking Self-

confidence ($p = 0.0342$), and Analyticity ($p = 0.0368$) (Tiwari et al., 2006). In addition,

the PBL group also showed "significantly greater improvement" (p. 547) compared to the

lecture group on the pre-test scores and the scores from the third administration (after the

first year): significant differences were observed in favor of the PBL group on the overall

score ($p = 0.0083$), Analyticity ($p = 0.0354$), and Truthseeking ($p = 0.0090$) (Tiwari et al.,

2006). Finally, the PBL group showed "significantly greater improvement" (p. 547)

compared to the lecture group between pre-test scores and scores on the fourth administration (after the second year) in the areas of Systematicity (p =0.0440) and Truthseeking (p = 0.0173) (Tiwari et al., 2006). The authors concluded that PBL "provides students with a statistically reliable advantage in the development of critical thinking disposition over students who are taught using a lecturing format" (p. 552).

Tiwari et al.'s (2006) findings suggest the benefits of incorporating PBL as one type of active learning instructional strategy. The longitudinal format of the study, involving several administrations of the CCTDI (Tiwari et al., 2006), serves to facilitate future research using regression analyses to determine whether any subscales of the CCTDI serve as predictors for overall post-test CCTDI scores. In this manner, researchers could generate an understanding of critical thinking development over time, thus extending Paul and Elder's (1996) work on the stages of critical thinking development. In addition, further investigation into the relationship between the small-group component of PBL (Duch, Groh, & Allen, 2001) and critical thinking may provide useful insights into the application of Vygotsky's social learning theories (Powell & Kalina, 2009) to critical thinking instruction.

Whereas the previous researchers focused on small-group active learning techniques (Kim, Sharma, Land, & Furlong, 2013; Tiwari, Lai, So, & Yuen, 2006), Kaddoura (2013) studied the effects of an active learning strategy that can be done in pairs. The researcher examined the relationship between use of the "Think, Pair, Share" (p. 3) instructional strategy and the critical thinking skills of student nurses in two sections of a health assessment course at a northeastern U.S. college (Kaddoura, 2013). Using the "Think, Pair, Share" strategy, instructors gave students a question to first

consider on their own and then to discuss with a partner; afterwards, students were asked

to share their ideas with the entire class (Kaddoura, 2013). To gather pre-test and post-

test data on the students' critical thinking, Kaddoura used the "Health Education Systems,

Inc." (HESI) (p. 3) critical thinking exam. As part of the research methodology, the

"Think, Pair, Share" strategy was implemented as a treatment for the section that served

as the experimental group ($n = 45$); the other section served as the control group ($n = 46$)

and did not receive the treatment (Kaddoura, 2013). Analysis of the pre-test and post-test

data revealed an increase of 42.9 points on the experimental group's mean HESI scores;

in contrast, the mean scores for the control group increased by 12.43 points (Kaddoura,

2013). A t-test of independent samples comparing the increase in the experimental

group's mean HESI scores to the increase in the control group's mean HESI scores

revealed a significant difference ($t = 4.327$, $df = 78$, $p < 0.001$). Kaddoura's findings

strongly suggest that adding the "Think, Pair, Share" active learning strategy to regular

instruction had a positive impact on students' critical thinking. However, Kaddoura's

sample consisted of nursing students only; therefore, her results might not generalize to

other groups, such as first-year college students.

While the previously mentioned researchers addressed the measurable impacts of

active learning strategies on critical thinking, Lumpkin, Achen, and Dodd (2015) focused

their research on students' opinions regarding the efficacy of active learning techniques

with regard to improving critical thinking skills. Lumpkin et al. (2015) studied students'

perceptions of the effect of regular use of "exploratory writing assignments" (p. 122)

involving reflection on course content combined with small-group discussions on what

students were learning. The authors collected data from a sample of 208 graduate and

undergraduate students from four courses within two programs: physical education and sports management; a fifth class was a general education requirement open to all majors (Lumpkin et al., 2015). At the end of the semester, frequency data were collected from a researcher-created questionnaire that measured students' opinions regarding the instructional activities that had been used in class, such as "describing in writing the major points of a thesis" (p. 127) and working in pairs to review concepts from the instructor's lecture (Lumpkin et al., 2015). Using a 3-point scale in which zero equaled "not at all" (p. 128), one equaled "sometimes" (p. 128), and two equaled "often" (p. 128), the questionnaire required students to evaluate the degree to which the instructional activities positively affected their learning (Lumpkin et al., 2015).

Analysis of the frequency data revealed that undergraduate students felt that the writing assignments were "often beneficial" (44%) and "sometimes beneficial" (44%); graduate students found the writing assignments to be "often beneficial" (52%) and "sometimes beneficial" (48%) (Lumpkin et al., 2015). With regard to paired activities, undergraduates indicated that working with a partner was "often helpful" (35%) and "sometimes helpful" (54%); graduate students also found paired work to be "often beneficial" (44%) and "sometimes beneficial" (52%). Based on their analyses of the results, Lumpkin et al. concluded that both undergraduate and graduate students believed that the writing assignments and small-group discussions had a positive impact on their learning. According to the authors, students felt that "when they reflect upon, write about, and then discuss what they are learning, it clarifies their thinking and deepens their understanding and retention" (p. 129).

Higher-Order Questions and Critical Thinking

As several studies have shown, students attain directly measurable as well as perceived improvements in their critical thinking from the use of active learning strategies during instruction (Kaddoura, 2013; Kim, Sharma, Land, and Furlong, 2013; Lumpkin et al., 2015; Tiwari, Lai, So, & Yuen, 2006). These active learning strategies take on added benefits with the inclusion of higher-order questions that require students to process new knowledge at higher levels of complexity (Sousa, 2011) by considering relationships between various elements and formulating opinions regarding different topics (Crawford, 2005). As previously discussed, Shim and Walczak (2012) touched on the importance of instructor questions in their findings of significant relationships between instructors' implementations of challenging questions and students' gains in critical thinking on the CAAP assessment. According to Tofade, Eisner, and Haines, (2013), the instructional use of effective questions is vital to "student learning by probing for understanding, encouraging creativity, stimulating critical thinking, and enhancing confidence" (p. 1). The comprehensive review of research for this literature review resulted in many studies that focused on the use of higher-order questions with primary and secondary students (Di Teodoro, S., Donders, S., Kemp-Davidson, J., Robertson, P., & Schuyler, L., 2011; Kian, O., Hart, C., & Poh Keong, C., 2016; Kracl, C. L., 2012; Peterson, D. S., & Taylor, B. M., 2012).

A study that involved the use of higher-order questioning at the college level focused on the effects of two workshops designed to increase the use of higher-order questions by instructors in 14 nursing schools in Pakistan (Gul et al., 2014). An experimental group consisting of 44 instructors was observed and audiotaped in the classroom, both before and after the subjects attended the workshops (Gul et al., 2014).

A control group, consisting of 47 instructors who did not attend the workshops, was also observed and audiotaped while teaching (Gul et al., 2014). Afterwards, the researchers used Bloom's (1956) taxonomy to code the lesson transcripts "for types and levels of thinking" (p. 42). An ANOVA conducted on the experimental group data showed no significant differences in instructors' use of higher-order questions before and after attending the workshops ($p > 0.05$) (Gul et al., 2014). In addition, the researchers found no significant differences in the use of higher-order questions between the experimental and control groups ($p > 0.05$) (Gul et al., 2014).

Gul et al.'s (2014) study provided interesting insight into the utility of teacher-development workshops in encouraging college instructors to include higher-order questions during discussion and instruction. However, Gul et al. did not address one of the important considerations of the current research study: the impact of discussion strategies (small versus whole-group) that incorporate higher-order questions on the critical thinking dispositions of community college students enrolled in an English Composition II course. Accordingly, this review of literature points to the need for research regarding the relationship between the use of higher-order questions, the instructional use of the questions (i.e. small- versus whole-group), and the critical thinking dispositions of students enrolled in community college.

English Instruction and Critical Thinking

As with the previously-mentioned study by Gul et al. (2014), higher-order questions reflecting the top three levels of Bloom's Revised Taxonomy (Krathwohl, 2002) were a focus of the current dissertation study. Specifically, higher-order questions were used in both the experimental and control groups as integral parts of English

Composition II instruction. A review of recent literature on the relationship between critical thinking and English/language arts instruction revealed a number of studies that were conducted within primary and secondary educational settings (Duesbery, & Justice, 2015; Law, & Kaufhold, 2009; VanTassel-Baska, Bracken, Feng, & Brown, 2009). In addition, several studies investigated the relationship between critical thinking and English as a Foreign Language (EFL) instruction (Bagheri, 2015; Barnawi, 2011; Indah, 2017; Shaarawy, 2014; Tous, Tahriri, & Haghighi, 2015).

Although the research on critical thinking and EFL instruction did not apply to the unique context of the dissertation study, some of the previous research provided useful insight into the various ways that students' critical thinking can be influenced by English instruction. For example, using a sample of 121 EFL students in an Indonesian university, Indah (2017) investigated the relationship between critical thinking, writing performance, and topic familiarity in two types of argumentative essays: one in which the students chose the topic and one in which the instructor assigned the topic. To assess topic familiarity within the essays, Indah created a rubric based on Franker's (2011) mind map instrument, which examines "the arrangement of concepts, links and linking lines, content, and text" (as cited in Indah, 2017, p. 232). In addition, Indah measured critical thinking demonstrated within the essays using Stapleton's (2001) critical thinking rubric. Finally, the overall writing performance on the essays was assessed using the ESL Composition Profile (Jacobs et al., 1981, as cited in Indah, 2017).

To analyze the relationships between critical thinking, topic familiarity, and writing performance in both the "student-initiated topic" (p. 229) essay and the "teacher-initiated topic" (p. 229) essay, Indah (2017) conducted a path analysis. With regard to

the student-generated topic, the path analysis revealed significant relationships between topic familiarity and writing performance ($p < .001$), topic familiarity and critical thinking ($p = .003$), and writing performance and critical thinking ($p < .001$) (Indah, 2017). For the teacher-initiated topic, the path analysis revealed significant relationships between topic familiarity and writing performance ($p = .008$) and writing performance and critical thinking ($p < .001$) (Indah, 2017). However, in the case of the teacher-initiated topic, no significant relationship existed between topic familiarity and critical thinking (Indah, 2017). With regard to this finding, Indah concluded that "when the student's specialized knowledge of the topic … is insufficient then the critical thinking cannot be identified well" (p. 234). Indah concluded that student-initiated topics allow students to better plan their writing, thus allowing their writing "to reflect critical thinking skills" (p. 234). Although not directly related to the current study, Indah's findings provide important perspective that can inform future research regarding the relationship between English instruction and critical thinking. Indah's findings on the benefits of student-initiated topics point to the importance of incorporating social constructivist instructional principles that allow students to create their own understanding while receiving support from teachers and peers (Powell & Kalina, 2009).

Summary

The goal of the literature review was to place the current research study within the context of the published research on critical thinking, active learning, classroom discussion, higher-order questioning, and English instruction. Furthermore, the literature review was used to establish the theoretical foundation for the current study by illuminating other researchers' findings regarding the role of student and teacher

characteristics and general and specific instructional strategies on the development of

postsecondary students' critical thinking skills. Interestingly, the review of literature also

revealed the need for further research, especially with regard to higher-order questioning

and critical thinking at the college-level and in specific curricular disciplines, such as

English composition courses. A description of the research methods utilized in the

dissertation study follows in chapter three.

Chapter 3: Method

The current study compared the benefits of small-group versus whole-group discussions incorporating higher-order questions on community college English Composition II students' critical thinking dispositions, as measured by the California Critical Thinking Disposition Inventory (CCTDI) (Facione, P. & Facione, N., 2007). In designing the study, the researcher sought to address the following research question and hypothesis:

Q1: Is there a difference between the critical thinking dispositions of community college English Composition II students based on small-group versus whole-group discussion of higher-order thinking questions?

H1: There is a significant difference between the critical thinking dispositions of community college English Composition II students who engaged in small-group discussion of higher-order thinking questions and community college English Composition II students who engaged in whole-class discussion of higher-order questions.

Research Design

To address the research question, the researcher used a quantitative pre-test/post-test control group design. Because random assignment of subjects to either the experimental or control groups was not possible, a nonequivalent control group design was implemented, which involved "random assignment of intact groups to treatments, not random assignment of individuals" (Gay, Mills, & Airasian, 2012, p. 270). To strengthen the study, the researcher followed Gay, Mills, and Airasian's (2012) suggestion to use groups that were "as equivalent as possible" (p. 270). Accordingly, the researcher

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selected two sections of English Composition II that were taught by the same instructor on the same two days of the week: Monday and Wednesday. In addition, both sections used the same textbook and met in the middle part of the instructional day: at 11:00 a.m. and 1:00 p.m., respectively.

Subjects

The population for the study was a community college in the southeastern United States. At the beginning of the fall 2015 term, 26,571 students were enrolled (FLDOE, 2016). Of that enrollment, 57% (15,162) of the students were female, and 43% (11,409) of the students were male (FLDOE, 2016).

The subjects for the study were selected from the 11:00 a.m. and 1:00 p.m. sections of an English Composition II course that were taught by the same instructor. As mentioned previously, the researcher was not able to randomly assign subjects to either the control or the experimental group. Therefore, a coin flip was used to randomly assign the 11:00 a.m. section to the experimental group and the 1:00 p.m. section to the control group. As a result, 24 subjects were placed in the experimental group, and 25 subjects were placed in the control group. However, due to student withdrawals, as well as the exclusion of subjects who were under the age of 18, the final count for both the experimental and control groups was 17 each, for a total of 34 subjects.

Intervention

Over the course of 14 consecutive weeks during the spring 2017 semester, subjects in the experimental group participated in one of four small-group discussion techniques on a weekly basis: "think, pair, share" (Kaddoura, 2013), "quick write" (Himmele, P., & Himmele, W., 2011), "Roundtable Writing," and "I Say Review"

(Kaufman & Wandberg, 2010). Each of the four discussion strategies required the subjects to address a higher-order question based on a short story that had been assigned for the class session; the questions had been previously agreed upon by the instructor and the researcher. In accordance with the literature on task complexity and critical thinking (Sousa, 2011), the questions required the subjects to process information at one of the top three levels of the Bloom's Revised Taxonomy: analyze, evaluate, and create (Krathwohl, 2002).

Two of the discussion strategies required subjects to work in pairs with a partner. In the "think, pair, share" strategy, the subjects were given a question to consider on their own before sharing their thoughts with a partner; afterwards, volunteers were asked to share their responses with the entire class (Kaddoura, 2013). Conversely, the "quick write" strategy required the subjects to write down their responses to the question before sharing with their partners; again, volunteers were asked to share their responses with the entire class (Himmele, P., & Himmele, W., 2011).

The "Roundtable Writing" and "I Say Review" discussion techniques varied from the previously mentioned strategies by requiring the subjects to work in groups of at least four (Kaufman & Wandberg, 2010). In the "Roundtable Writing" strategy, group members were asked to take turns recording their response to the higher-order question using the same piece of paper; volunteers were then asked to share their responses with the entire class (Kaufman & Wandberg, 2010). In contrast, the "I Say Review" method required group members to take turns verbally sharing their responses to the question; afterwards, volunteers were asked to share with the entire class (Kaufman & Wandberg, 2010).

The discussion strategies were used once a week on a rotating schedule (see Appendix E). The researcher conferred with the instructor to develop the higher-order thinking questions that were used with each strategy. Each question required students to demonstrate their understanding of the assigned short story at a high level of complexity as determined by Bloom's Revised Taxonomy (Krathwohl, 2002). For example, one question required students to interpret the meaning behind a character's words, and another question asked students to evaluate the results of a character's actions (see Appendix E). To ensure the consistent and appropriate use of the strategies, the researcher provided the instructor with an implementation checklist for the semester (see Appendix E). The checklist included the name of the short story that was to be used each week, as well as the accompanying question prompt.

During the 14-week period, subjects in the control group read the same short stories and worked with the same higher-order question prompts that were used with the experimental group. However, the subjects in the control group did not participate in small-group discussion. Instead, they addressed the question prompts through whole-group discussion.

Other variables were held constant between the experimental and control groups. For example, both groups studied the same topics, such as common literary devices, literary critique, and writing fluency. Furthermore, both groups took the same assessments, which included five brief reader response essays, an exam assessing students' knowledge of literary devices, a literary critique, a research journal, and a final research essay. The instructor reported final grades for the two sections as both total points and as a percentage of 1000 possible points. However, due to IRB regulations at

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the community college where the research took place, the researcher was unable to obtain final course grades for students in the two sections.

Instrumentation

Pre-test and post-test data on the critical thinking dispositions of subjects in both the experimental and control groups were collected by administering the California Critical Thinking Disposition Inventory (CCTDI) (Facione, P. & Facione, N., 2007). The CCTDI used a six-point Likert-scale that ranged from "strongly agree" to "strongly disagree" (Insight Assessment, 2017). Using the Likert-scale, subjects were asked to self-report the degree to which they either agreed or disagreed with 75 statements related to critical thinking dispositional attributes, defined as the "mindset attributes that describe the ideal critical thinker" (Insight Assessment, 2017, p. 12).

The CCTDI measured the subjects' critical thinking dispositions across seven dimensions: truth-seeking, open-mindedness, analyticity, systematicity, critical thinking confidence, inquisitiveness, and cognitive maturity (Merker, 2010). The instrument provided an overall, composite score, ranging from 70-420, in which each subscale score was weighted equally (Insight Assessment, 2017). An overall score of 350 or higher indicated a strong disposition towards critical thinking (Merker, 2010). In addition, the CCTDI provided scores, ranging from 10-60, for each of the seven subscales (Insight Assessment, 2017). The subscale scores were divided into numerical ranges with corresponding descriptive labels determined by the test publishers based on their research (Insight Assessment, 2017). An explanation of these ranges and labels can be found in Table 1 below.

Table 1

Numerical Ranges and Descriptive Labels for Each of the Seven Subscales*

Range	Descriptive Label	Explanation
10-19	Strong Negative	Strong negativity toward attribute
20-29	Negative	Aversion to attribute
30-39	Inconsistent/Ambivalent	Ambivalent towards attribute
40-49	Positive	Consistently values attribute
50-60	Strong Positive	Subject applies attribute when thinking

*Source: Insight Assessment (2017)

In keeping with previous researchers' assertions that students should be encouraged to not only develop but also apply critical thinking skills (Halpern, 1999), this research study focused on the development of students' critical thinking dispositions. The CCTDI was chosen due largely to its reliability and validity in measuring adults' critical thinking dispositions. In 1991-1992, initial pilot studies were conducted on the instrument at three universities: two in the United States and one in Canada (Merker, 2010). Cronbach's alpha analysis conducted by the publisher on data from the initial pilot sample indicated that the composite scores on the CCTDI had an alpha coefficient "reaching or exceeding .91" (Insight Assessment, 2017, p. 63). Subsequent data collected from samples over a 15-year period resulted in alpha scores of .90 or higher for the overall instrument (Insight Assessment, 2017), indicating high reliability. Furthermore, concurrent validity was established through the instrument's correlation to other standardized higher-order reasoning assessments (Insight Assessment, 2017). A strong correlation was found between the CCTDI's overall score and the GRE's total score ($r = .719$, $p < .001$) (Insight Assessment, 2017). In addition, strong correlations were found between the CCTDI and the GRE Analytic subscale ($r = .708$, $p < .001$) and

between the CCTDI and the GRE Verbal subscale ($r = .716$, $p < .001$) (Insight Assessment, 2017).

Data Collection

Prior to the start of the spring 2017 semester, the researcher obtained IRB approval from both the university and the community college in which the research took place. During the first week of the spring 2017 semester, the researcher administered the CCTDI as a pre-test to both the experimental and control groups. Before administering the pre-test, the researcher acquired the subjects' oral consent (see Appendix F). To ensure confidentiality, the subjects were assigned a number, which they used on the CCTDI answer sheet instead of their names.

At the end of the semester, the researcher administered the CCTDI again as a post-test for both the experimental and control groups. As with the pre-test, the researcher acquired the subjects' oral consent before administering the post-test (see Appendix G). In lieu of using their names on the CCTDI answer sheet, the subjects used the same number that they used during the pre-test. The CCTDI pre-test and post-data were used to address the research question and hypothesis.

The researcher supplemented the quantitative data provided by the CCTDI with data that were collected through the demographic questionnaire, which was administered at the beginning of the semester to both the experimental and control groups (see Appendix A). Prior to administering the questionnaire, the researcher acquired the participants' oral consent (see Appendix F). The questionnaire collected data on the following variables: age, gender, major, cumulative GPA, and First Time in College (FTIC) status. The questionnaire was also used to gather the students' English

composition I grades and to determine whether any students were repeating English Composition II.

To protect the subjects' confidentiality, the researcher matched the demographic data to the number already assigned to the subjects when completing the CCTDI. Several students did not report their GPA on the questionnaire; therefore, the variable was eliminated from statistical analysis. However, all students reported their English Composition I grades. These grades were later used to provide context to the discussion of the experimental and control groups' CCTDI results.

The researcher also interviewed the English Composition II instructor to gather qualitative data to supplement the quantitative data. To conduct the interview, the researcher used a structured interview technique in which "the researcher has a specified set of questions" (Gay, Mills, & Airasian, 2012, p. 387). Prior to the interview, oral passive consent was obtained (see Appendix H). To ensure accurate collection of data during the interview, the interview was digitally recorded; this digital recording was later transcribed. The goal of the interview was to ascertain the instructor's perceptions of differences in critical thinking dispositions demonstrated by the experimental and control groups (see Appendix I).

To gather additional supplemental qualitative data, two student focus groups were conducted at the end of the semester: one for the experimental group and one for the control group. Prior to conducting the focus groups, oral passive consent was obtained from the subjects (see Appendix G). For the experimental group, the researcher asked questions regarding the use of the four small-group discussion strategies and how these strategies affected the way the subjects addressed the instructor's questions (see

Appendix B). In the control group, the researcher asked questions regarding the use of whole-class discussion and how that technique affected the way the subjects addressed the instructor's questions (see Appendix C). In both focus groups, the researcher attempted to prompt the subjects to discuss the ways in which their experiences with classroom discussion affected their perceptions regarding their personal critical thinking dispositions.

As with the instructor interview, the researcher used the structured interview technique to conduct the focus groups (Gay, Mills, & Airasian, 2012). The focus group sessions were digitally recorded and later transcribed. Students' comments from the focus groups were used to add context to the discussion of the researcher's findings in chapter five.

Data Analyses

The researcher used the results of the demographic survey (see Appendix A) to provide descriptive statistics on the experimental and control groups. Once compiled, the researcher used the demographic information to exclude from analysis the CCTDI scores of participants under the age of 18. Additionally, the researcher reported the demographic data to provide context for the analyses of the CCTDI results. In particular, the subjects' self-reported English Composition I grades were beneficial when comparing the CCTDI performance of the experimental and control groups.

To analyze the CCTDI pre-test and post-test data, the subjects' answer sheets were sent to the publisher for scoring (Insight Assessment, 2017). The subjects' confidentiality was protected since no names were written on the answer sheets. Instead, the subjects used numbers that had been provided by the researcher. To ensure that the

data for the experimental and control groups could be differentiated, group numbers were recorded on each answer sheet, as directed by the test's publisher (Insight Assessment, 2017). After scoring the pre-tests and post-tests, Insight Assessment provided the researcher with the results, which were compiled in a Microsoft Excel® document. Using the assigned test-taker numbers, as well as the group numbers, the researcher was able to match each subject's pre- and post-test CCTDI scores with their demographic survey responses.

Preliminary analyses. Before addressing the research hypothesis, the researcher conducted preliminary analyses of the demographic and CCTDI data. The demographic data were analyzed to determine the sample's characteristics, including age, gender, and English Composition I scores. In addition, the *Expectation-Maximization* (*EM*) and *Multiple Imputations* (*MI*) analyses of the Statistical Package for the Social Sciences (SPSS) were used to address the need for possible imputation of missing pre-test and post-test CCTDI data.

Normality of CCTDI data distribution. To assess the normality of the CCTDI data distribution, the researcher used the *Shapiro-Wilk* test statistic. *Shapiro-Wilk* is appropriate to determine the relative normality of data arrays of 2,200 or less (T. Gollery, personal communication, August 17, 2017). Non-statistically significant *Shapiro-Wilk* values ($p > .05$) were considered indicative of relative normality within the CCTDI data arrays, thereby supporting the researcher's use of the inferential procedures that require the assumption of normality.

Internal Reliability. Using Cronbach's Alpha (a), the researcher assessed the internal consistency (reliability) of the subjects' performance on the CCTDI. The

researcher conducted pre-test, post-test, and omnibus measures of internal reliability of the subjects' CCTDI performance. The F-Test was used to assess statistical significance of the data's internal reliability. The probability level of $p < .05$ was used to determine the statistical significance of the findings.

Descriptive Analyses To provide context for the statistical analyses, the researcher first analyzed the CCTDI data through descriptive analyses. The researcher disaggregated the experimental and control groups' CCTDI composite pre- and post-test scores according to gender and ethnicity. Following the descriptive analyses, the researcher began the statistical analyses of the CCTDI data.

Analyses of data to address the hypothesis. Using the CCTDI post-test scores for the experimental and control groups, the researcher utilized inferential statistical analyses to test the research hypothesis, which stated that there is a significant difference between the critical thinking dispositions of community college English Composition II students who engage in small-group discussion compared to community college English Composition II students who engage in whole-class discussion. Measures of central tendency (mean scores) and variability (standard deviations) were used to compare the experimental and control groups' CCTDI composite post-test scores, as well as the two groups' post-test subscale scores. The statistical significance of mean composite and subscale score differences between the experimental and control groups was assessed using *t*-tests of independent means. In conducting the *t* test, the probability level was set at .05 or "5 out of 100 chances that the observed difference occurred by chance" (Gay, Mills, & Airasian, 2012, p. 345). Furthermore, Levene's Test statistic was used to determine if equality of variances existed between the experimental and control groups.

Non-statistically significant ($p > .05$) Levene values indicated that equality of variance was present in the sample.

To determine growth in critical thinking dispositions, the researcher conducted paired-sample *t*-tests on the pre- and post-test CCTDI composite scores for both the experimental and control groups. In addition, paired sample *t*-tests were used to analyze the seven pre- and post-test subscale scores for both groups. In conducting the paired *t*-tests, the significance level was set at $p < .05$.

Qualitative Data As previously mentioned, qualitative data were gathered through instructor and focus group interviews at the end of the semester. Due to limited responses during the two focus groups, the researcher did not collect sufficient data to warrant the use of coding procedures. Instead, the transcripts from the instructor and focus group interviews were reviewed and used to add additional perspective to the discussion of the CCTDI data in chapter five.

Summary

To gather quantitative data to address the study's research question, the researcher administered the California Critical Thinking Disposition Inventory (CCTDI) (Facione, P. & Facione, N., 2007) as a pre-test and post-test to both the experimental and control groups. The researcher performed a *t*-test of independent samples on the CCTDI post-test composite and subscale scores to determine whether significant differences existed between the two groups. Additionally, the researcher used paired sample *t*-tests to compare the pre- and post-test composite and subscale CCTDI scores for both the experimental and control groups. The quantitative analyses were used to address the

research question and hypothesis. The results of the analyses are presented in chapter four.

To provide additional context for the interpretation of the CCTDI data, the researcher conducted instructor and student focus group interviews at the end of the semester. The interviews were digitally recorded and later transcribed. The qualitative data gathered from the interviews were used to add context to the discussion of the study's findings in chapter five.

Chapter 4: Results

The research question that guided the current study addressed whether there was a difference between the critical thinking dispositions of community college English Composition II students based on their participation in either small-group or whole-group discussion of higher-order thinking questions. The small-group discussions employed in the experimental group were facilitated through the use of four strategies on a weekly, rotating basis: "think, pair, share" (Kaddoura, 2013), "quick write" (Himmele, P., & Himmele, W., 2011), "Roundtable Writing," and "I Say Review" (Kaufman & Wandberg, 2010). For the control group, examination of the same higher-order questions was facilitated through whole-group discussion. The researcher hypothesized that there would be a significant difference between the critical thinking dispositions of the students who engaged in the small-group discussions of the higher-order questions and the students who participated in the whole-class discussions of these questions.

In comparing the effects of small- versus whole-group discussion on students' critical thinking dispositions, the researcher first had to establish a clear definition of critical thinking dispositions. For the purposes of the current study, critical thinking dispositions were described using the seven subscales of the California Critical Thinking Disposition Inventory (CCTDI): truth-seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgement (Facione, P. & Facione, N., 2007). The CCTDI's definitions were chosen due to the instrument's direct alignment with the construct definition agreed upon by the 46 experts who contributed to the Delphi report on critical thinking (Facione, P., Facione, N., & Giancarlo, 2000). Another consideration in the use of the CCTDI was the fact that the

instrument had been used by other researchers to measure college students' critical thinking dispositions (Giddens & Gloeckner, 2005; Tiwari, Lai, So, & Yuen, 2006).

To investigate the research question, the researcher employed a quantitative pre-test/post-test control group design using two randomly assigned sections of a community college English Composition II course taught by the same instructor. One Composition II section, which served as the experimental group, participated in a 14-week treatment in which four small-group discussion strategies were implemented each week on a rotating basis; the strategies were used to structure the small-group discussions of a higher-order question based on the assigned literature selection. During the same 14-week period, the control group used whole-group discussion to address the same higher-order questions from the same short stories.

Data collection for the study consisted of a demographic questionnaire that was administered to both groups at the beginning of the spring 2017 semester. In addition, the quantitative data necessary to address the research hypothesis were collected through the pre- and post-test administration of the CCTDI. A description of the demographic data and the statistical procedures used to analyze the CCTDI data can be found in the sections that follow.

Demographic Data

To provide the background necessary for the interpretation of the CCTDI data, the researcher first analyzed the demographic data to acquire a better understanding of the experimental ($n = 17$) and control group's ($n = 17$) characteristics of gender, ethnicity, age, and English Composition I (ENC 1101) grades. The results of these analyses are displayed in Table 2.

Table 2

Demographic Results by Group, Gender, Ethnicity, Age, and English
Composition I Grade

	Experimental Group *n*=17	Control Group *n*=17
Gender		
Male	7	4
Female	10	13
Ethnicity		
White	6	7
Hispanic	3	8
Mixed-race	3	1
African-American	2	1
No answer	3	0
Age		
Median	20	19
Mode	18	19
Comp I Mean Grade		
GPA	3.24	3.47
%A/B Grades	76.50%	94.10%

Note. The mean age was not calculated to reduce the effect of outliers.

Demographic analysis of the data regarding gender revealed a disproportionate number of females in both the experimental and control groups. The gender makeup for both groups seemed to be a reflection of the population from which the sample was obtained, since the community college where the study took place reported a greater enrollment of females than males at the beginning of the fall 2015 term (FLDOE, 2016). In addition, the analysis of ethnicity data in the current study revealed higher numbers of whites and Hispanics in both groups compared to other ethnic groups. The median ages of both groups were quite similar. As a result of these analyses, the gender and ethnic makeup of both groups may have implications for the generalizability of the study's findings to the general population of community college students in the United States.

Interestingly, the analysis of English Composition I (ENC 1101) grades revealed that the group averages were comparable to a "B" grade in their first college composition course; however, subjects in the control group had a markedly higher percentage of "A" and "B" grades (94.1%) than subjects in the experimental group (76.5%). The researcher postulated that the differences between the experimental and control groups with regard to measurable achievement in English Composition I may have had a mediating effect on the performance of both groups on the CCTDI.

Preliminary Analyses

In addition to the analyses of the demographic data, preliminary analyses were also conducted using the CCTDI data. Using the Statistical Package for the Social Sciences (SPSS), *Expectation-Maximization* (*EM*) and *Multiple Imputations* (*MI*) were computed to determine the impact of missing data. The two procedures revealed that the study's data set was completely intact. Therefore, further analysis and possible imputation of missing data procedures were not necessary (T. Gollery, personal communication, August 17, 2017). Furthermore, *Shapiro-Wilk* analysis indicated that the composite and subscale CCTDI data array for both the experimental and control groups was normally distributed ($p > .05$).

Internal consistency (reliability) of the subjects' performance on the CCTDI was assessed using Cronbach's alpha (α). For both the experimental and control groups, omnibus alpha levels were determined by combining CCTDI pre- and post-test scores. Additionally, separate alpha levels were computed on the CCTDI pre-test and post-test composite scores for both groups. The probability level of $p < .05$ was used to establish

the statistical significance of the results. The alpha levels by treatment group are depicted in Table 3.

Table 3

Cronbach Alpha Analyses of Internal Reliability by Treatment Group

Treatment Group	Omnibus α	Pre-test α	Post-test α
Experimental (n=17)	0.75[*]	0.73[*]	0.65[*]
Control (n=17)	0.73[*]	0.55[*]	0.66[*]

[*]$p < .001$

The alpha levels for the omnibus scores and the pre- and post-test scores indicate that the internal consistency of the sample's performance on the CCTDI is acceptable. However, the alpha level for the control group's pre-test scores ($\alpha = .55$) is close to the level deemed unacceptable by many researchers ($\alpha < .50$) (University of Virginia, 2017). Moreover, the consistency for the experimental and control groups' performance is considerably lower than that of the instrument's norm group, probably due to the small sample size (*n*=17 in each treatment group) in this study (P. LeBlanc, personal communication, September 23, 2017).

The preliminary analyses revealed that there were no missing data. In addition, the CCTDI data were normally distributed, and the internal consistency of the subjects' performance on the CCTDI, although lower than the instrument's norm group, was deemed acceptable. As a result, the researcher felt confident to proceed with the data analyses to address the research hypothesis.

Descriptive Analyses

Before engaging in statistical analyses of the CCTDI data, the researcher first used descriptive analyses to disaggregate the CCTDI composite pre- and post-test scores according to gender and ethnicity. The results of these analyses are displayed in Tables 4 and 5.

Table 4
Mean CCTDI Pre-test Composite Scores by Treatment Group, Gender, and Ethnicity

	Experimental Group (n= 17, $\overline{X}$ = 319)	Control Group (n = 17, $\overline{X}$ = 292)
Gender		
Male	314 (n=7, SD=37)	296 (n=4, SD=17)
Female	323 (n=10, SD=20)	291 (n=13, SD=19)
Ethnicity		
White	317 (n=6, SD=28)	297 (n=7, SD=20)
Hispanic	302 (n=3, SD=19)	285 (n=8, SD=13)
Mixed-race	350 (n=3, SD=16)	280 (n=1, SD=NA)
African-American	323 (n=2, SD=15)	325 (n=1, SD=NA)
No answer	309 (n=3, SD=34)	NA

Note. Scores have been rounded.

Table 5
Mean CCTDI Post-test Composite Scores by Treatment Group, Gender, and Ethnicity

	Experimental Group ($n= 17, \overline{X}= 301$)	Control Group ($n = 17, \overline{X}= 293$)
Gender		
Male	290 ($n=7, SD=30$)	282 ($n=4, SD=7$)
Female	309 ($n=10, SD=31$)	297 ($n=13, SD=21$)
Ethnicity		
White	298 ($n=6, SD=35$)	291 ($n=7, SD=21$)
Hispanic	292 ($n=3, SD=28$)	294 ($n=8, SD=20$)
Mixed-race	285 ($n=3, SD=30$)	281 ($n=1, SD=$ NA)
African-American	330 ($n=2, SD=23$)	316 ($n=1, SD=$NA)
No answer	314 ($n=3, SD=34$)	NA

Note. Scores have been rounded.

The disaggregation of the pre- and post-test composite scores revealed that, in the experimental group's pre-test, as well as the experimental and control groups' post-tests, the mean score for females was higher than both the mean group score and the mean male score. The researcher suspects that the greater number of females in both groups affected the mean scores, causing the scores to skew in favor of females. Interestingly, although there were only four male subjects in the control group, the mean pre-test composite score for control group males was higher than both the pre-test control group mean score and the pre-test control group female mean score. The researcher believes the control

group males' pre-test results may be a reflection of the lower internal consistency of the control group's pre-test, which had an alpha level of 0.55.

The researcher also surmised that the ethnic makeup of the experimental and control groups had a mediating effect when disaggregating the pre- and post-test composite scores by ethnicity. The small numbers of certain ethnic groups within the two samples affected the mean scores, resulting in some means that were well-above the group mean. Because of small sample sizes among represented ethnicities, the researcher decided to conduct statistical analyses on the CCTDI scores by group (experimental and control) rather than by gender or ethnicity.

Data Analyses to Address the Research Hypothesis

Statistical analyses of the composite and subscale CCTDI scores for both the experimental and control groups were used to address the research hypothesis that there would be a significant difference in critical thinking dispositions between students who engaged in small-group discussion of higher-order questions and students who participated in whole-group discussion of these questions. To test this hypothesis, the researcher compared the measures of central tendency (mean scores) and variability (standard deviations) in the CCTDI composite post-test scores for both the experimental and control groups. To determine whether the mean post-test composite scores of the two groups were significantly different, the researcher used a *t*-test of independent means. The results of the independent *t*-test for CCTDI composite post-test scores can be seen in Table 6.

Table 6

CCTDI Post-test Comparison of Composite Scores by Treatment Group

Group	Mean	SD	Mean Difference	*t*	*p*
Experimental (*n* = 17)	301.41	31.18	7.94	0.89	0.38
Control (*n* = 17)	293.47	19.69			

While the experimental group demonstrated higher mean composite post-test CCTDI scores than the control group, the independent *t*-test revealed that the difference in CCTDI composite post-test scores between the experimental (small-group discussion) group and control (whole-group discussion) group was not statistically significant. Therefore, the researcher rejected the hypothesis that there would be a difference in students' critical thinking dispositions based on their participation in either small-group or whole-group discussion of higher-order thinking questions. The data from the current study suggest that the type of discussion group methods used to address higher-order questions does not have a significant impact on critical thinking dispositions.

The researcher used *t*-tests of independent means to compare the mean post-test scores of the experimental and control groups on each of the seven subscales. The results of the analyses are displayed in Table 7.

Table 7

CCTDI Mean Subscale Post-test Comparisons Between Experimental Group (n = 17) and Control Group (n = 17)

Subscale	Mean	SD	Mean Difference	t	p
Truth-seeking					
Experimental	34.94	9.93	1.24	0.44	0.66
Control	33.71	5.72			
Open-mindedness					
Experimental	43.47	7.5	0.24	0.11	0.92
Control	43.23	4.97			
Inquisitiveness					
Experimental	48.83	6.26	2.53	1.3	0.2
Control	46.29	5.06			
Analyticity					
Experimental	44.24	4.88	0.53	1.3	0.74
Control	43.71	4.36			
Systematicity					
Experimental	42.88	6.89	2.0	1.08	0.29
Control	40.88	3.35			
Confidence in Reasoning					
Experimental	46.35	7.10	0.29	0.15	0.89
Control	46.06	4.45			
Maturity of Judgement					
Experimental	41.00	10.65	1.35	0.46	0.65
Control	39.65	5.95			

The comparison of mean subscale post-test scores revealed that, for each subscale, the differences between the experimental (small-group discussion) group and control (whole-group discussion) group were not statistically significant. These results provide further insight into the effects of small- and whole-group discussion of higher-order questions on students' critical thinking dispositions. The data suggest that, even

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when critical thinking dispositions are measured according to their component attributes, as defined by the instrument's publisher (Insight Assessment, 2017), type of discussion method (small- versus whole-group) does not make a difference with regard to critical thinking dispositions.

To determine whether there were significant differences between the pre- and post-test scores within the experimental (small-group discussion) group and within the control (whole-group discussion) group, paired samples t-tests were conducted on the composite and subscale CCTDI scores. The results of the paired samples t-test for the experimental group can be found in Table 8.

Table 8

Experimental Group Pre-test/Post-test Comparisons on Composite and Subscale CCTDI Scores (n = 17)

Scale	Mean	SD	Mean Difference	t	p^*
Composite					
Pre-test	319.29	27.40	-17.88	2.25	0.04*
Post-test	301.41	31.18			
Truth-seeking					
Pre-test	39.47	7.95	-4.53	2.48	0.02*
Post-test	34.94	9.93			
Open-mindedness					
Pre-test	43.65	5.27	-0.18	0.12	0.91
Post-test	43.47	7.5			
Inquisitiveness					
Pre-test	52.59	5.04	-3.76	2.2	0.04*
Post-test	48.82	6.26			
Analyticity					
Pre-test	47.06	6.06	-2.82	2.28	0.04*
Post-test	44.24	4.88			
Systematicity					
Pre-test	45.29	5.53	-2.41	1.67	0.11
Post-test	42.88	6.89			
Confidence in Reasoning					
Pre-test	46.88	7.62	-0.53	0.29	0.77
Post-test	46.35	7.10			
Maturity of Judgement					
Pre-test	44.53	6.62	-3.53	1.61	0.13
Post-test	41.00	10.65			

Note. All numbers have been rounded to the second decimal.
$^*p < .05$

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The paired samples *t*-test revealed that the experimental group had a significant

drop in composite CCTDI scores (-17.88 points, $p = 0.04$). A review of the analyses

indicated that the experimental group's post-test scores for all seven subscales were also

lower than the pre-test scores for the subscales. Within the following subscales, this drop

in scores was significant: truth-seeking (-4.53 points, $p = 0.02$), inquisitiveness (-3.76

points, $p = 0.04$), and analyticity (-2.82 points, $p = 0.04$). The data appear to suggest that

small-group discussion of higher-order questions does not lead to gains in critical

thinking dispositions. However, the researcher noted that the students in both groups

(experimental and control) seemed more fatigued when taking the post-test than when

taking the pre-test in the beginning of the semester, which very likely influenced the

results. In addition, the researcher observed that the experimental and control groups

rushed through the post-test, probably because it was administered at the end of the

semester.

To provide the necessary perspective to the experimental group's pre- and post-

test CCTDI scores, a paired samples *t*-test was also conducted on the control group's

CCTDI pre- and post-test scores. The results of the analyses can be found in Table 9.

Table 9

Control Group Pre-test/Post-test Comparisons on CCTDI Composite and Subscale Scores (n = 17)

Scale	Mean	SD	Mean Difference	T	p
Composite					
Pre-test	291.88	18.43	1.59	-0.34	0.74
Post-test	293.47	19.69			
Truth-seeking					
Pre-test	33.29	6.48	0.41	-0.34	0.74
Post-test	33.71	5.72			
Open-mindedness					
Pre-test	43.65	5.29	-0.41	0.33	0.75
Post-test	43.24	4.97			
Inquisitiveness					
Pre-test	46.65	4.81	-0.35	0.25	0.81
Post-test	46.29	5.06			
Analyticity					
Pre-test	43.29	2.78	0.41	-0.4	0.69
Post-test	43.71	4.36			
Systematicity					
Pre-test	39.53	5.05	1.35	-0.93	0.37
Post-test	40.88	3.35			
Confidence in Reasoning					
Pre-test	46.47	4.85	-0.41	0.27	0.79
Post-test	46.06	4.45			
Maturity of Judgement					
Pre-test	39.18	5.36	0.47	-0.34	0.74
Post-test	39.65	5.95			

Note. All numbers have been rounded to the second decimal.

The overall composite post-test CCTDI scores for the control group increased by 1.59 points, which was not significant ($p = 0.74$). In addition, although not significant, the control group's post-test scores increased for the following subscales: truth-seeking (0.41 points), analyticity (0.41 points), systematicity (1.35 points), and maturity of judgement (0.47). However, as mentioned previously, confounding variables, such as test-taker fatigue and timing of the CCTDI post-test administration, likely affected these results.

Review of Qualitative Data

To supplement the quantitative CCTDI data, the researcher gathered qualitative data through an instructor interview, as well as focus group interviews with both the experimental and control groups. To ensure data accuracy, the interviews were digitally recorded and later transcribed. The qualitative data were not coded due to a lack of adequate responses in the focus group interviews; instead, the transcriptions were reviewed by the researcher to provide additional perspective with regard to the discussion of the results of the CCTDI data in chapter five.

Summary

The researcher compared the impact of small-group discussion of higher-order questions to the impact of whole-group discussion of higher-order questions with regard to students' critical thinking dispositions. Based on research into the differing impacts of small- versus whole-group discussion (Pollock et al., 2011), the researcher hypothesized that there would be a significant difference between the critical thinking dispositions of students who discussed higher-order questions in small groups and students who discussed higher-order questions via a whole-group method. Pre- and post-test data on

students' critical thinking dispositions were gathered through the administration of the California Critical Thinking Disposition Inventory (CCTDI) (Facione, P. & Facione, N., 2007).

Statistical analyses revealed no significant differences between the CCTDI composite and subscale post-test scores of students who discussed higher-order questions in small groups and students who discussed these same questions through whole-group discussions. Therefore, the research hypothesis was rejected. The results of the study are discussed in chapter five.

Chapter 5: Discussion

As previously mentioned, the development of students' critical thinking is a vital matter of concern for professionals working in higher education (Nicholas & Raider-Roth, 2016; Shim & Walczak, 2012). In fact, many universities include critical thinking as part of their mission statements (Lafayette College, 2017; Marietta College, 2017) and their accreditation process (University of Louisville, 2017; UTPB, 2017). The motivation for the current study was to address the issue of critical thinking instruction in higher education by comparing the differences of small-group discussion of higher-order questions and whole-group discussion of higher-order questions on the development of community college students' critical thinking dispositions.

For the purposes of the study, critical thinking dispositions were operationalized according to the composite score and the seven subscales of the California Critical Thinking Disposition Inventory (CCTDI): truth-seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgement (Facione, P. & Facione, N., 2007). The study's sample consisted of 34 English Composition II students enrolled at a community college in the southeastern United States. The research question addressed whether small-group discussion of higher-order questions or whole-group discussion of higher-order questions would have a greater impact on the students' critical thinking dispositions. The researcher hypothesized that there would be a significant difference between the critical thinking dispositions of students based on the manner in which they discussed the higher-order questions: small-group versus whole-group.

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To test the hypothesis, the researcher utilized a quantitative pre-test/post-test control group design in which one section of the English Composition II course, which was randomly assigned as the experimental group, participated in small-group discussions of higher-order questions based on assigned short stories. These small-group discussions were facilitated through the following strategies, which were employed on a weekly, rotating basis: "think, pair, share" (Kaddoura, 2013), "quick write" (Himmele, P., & Himmele, W., 2011), "Roundtable Writing," and "I Say Review" (Kaufman & Wandberg, 2010). A second section of the course was randomly assigned to serve as the control group and participated in whole-group discussion of the same higher-order questions based on the same short stories.

Pre-test data on the students' critical thinking dispositions were collected through the administration of the CCTDI at the beginning of the spring 2017 semester. Post-test data on the CCTDI were collected at the end of the term. Qualitative data, which served to add context to the analysis of the CCTDI data, were gathered by the researcher through instructor and focus-group interviews at the end of the term.

To address the research question and hypothesis, the researcher used *t*-tests of independent samples to compare the experimental (small-group discussion) and control (whole-class discussion) groups' post-test composite and subscale scores on the CCTDI. In addition, the researcher used paired-sample *t*-tests to conduct within-group comparisons of the experimental and control groups' pre- and post-test CCTDI scores to determine whether students demonstrated growth in critical thinking dispositions relative to their participation in different forms of discussion groups: small- versus whole-group.

Summary of Results

The comparison of the mean CCTDI post-test scores revealed that the experimental (small-group discussion) group's mean composite post-test scores were higher by 7.94 points; however, this difference was not significantly different from the control (whole-group discussion) group ($p = .38$). As a result, the research hypothesis was rejected. A further analysis of subscale post-test scores revealed that, for each subscale, the experimental group's mean score was higher. As with the composite post-test scores, the differences between subscale scores were not significant. The results of the analyses suggest that, with regard to the discussion of higher-order thinking questions, the type of discussion group (small- versus whole-group) was not a factor in students' directly-measured critical thinking dispositions.

To provide deeper insight into the CCTDI post-test scores, the researcher conducted paired sample t-tests of the pre- and post-test scores for each group. The analyses revealed that the experimental (small-group discussion) group's composite CCTDI scores decreased by 17.88 points from pre- to post-test; this decrease was significant ($p = 0.04$). In addition, the experimental group's scores decreased from pre- to post-test across all seven subscales. For the following three subscales, the decrease in scores was significant: truth-seeking (-4.53 points, $p = 0.02$), inquisitiveness (-3.76 points, $p = 0.04$), and analyticity (-2.82 points, $p = 0.04$).

Interestingly, the control (whole-group discussion) group's composite CCTDI scores increased by 1.59 points from the pre-test to the post-test; however, this increase was not significant ($p = 0.74$). Furthermore, the control group's CCTDI scores increased for the following subscales: truth-seeking (0.41 points), analyticity (0.41 points),

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systematicity (1.35 points), and maturity of judgement (0.47). As with the group's overall scores, the subscale increases were not significant.

Discussion of Results

The analyses of the CCTDI pre-test composite scores suggested that, at the beginning of the study, neither the experimental nor the control group demonstrated the disposition to think critically. The analyses of the CCTDI post-test composite scores suggested that, for both groups, there was no significant increase in these dispositions at the study's conclusion. Confounding variables likely affected the experimental and control groups' performance on the CCTDI post-test, thus influencing any conclusions that can be drawn from a comparison of the CCTDI pre-and post-test data.

Despite the issues with the CCTDI post-test administration, which may have impacted the accurate measurement of the experimental and control groups' critical thinking dispositions at the end of the study, the researcher also surmises that, because both groups began the study with low critical thinking dispositions, the students required a longer period of time than the study's 14-week treatment period to increase their critical thinking dispositions. In addition, the researcher postulates that, to improve their critical thinking dispositions, the students in both groups would require explicit critical thinking instruction, as opposed to the study's implicit critical thinking instruction, which was facilitated through the use of higher-order questions during small-group and whole-group discussions. The researcher's suppositions are based on Paul and Elder's (1996) critical thinking developmental model, which proposes that an individual's progression through the stages of critical thinking is dependent upon a combination of self-reflection and explicit critical thinking instruction.

Furthermore, although the statistical analyses of CCTDI composite and subscale scores did not reveal significant differences between the experimental (small-group discussion) and control (whole-group discussion) groups, the comparison of both groups' CCTDI post-test scores still led to some interesting findings that can benefit future instruction. For example, according to the test publisher's assignment of descriptive labels of critical thinking dispositions to the numerical score ranges (Insight Assessment, 2017), both groups scored in the positive range (see Table 1) on the post-test for five subscales: open-mindedness, inquisitiveness, analyticity, systematicity, and confidence in reasoning. According to the test publisher, a score within the positive range indicates that subjects value the specific disposition (Insight Assessment, 2017). One may notice a similarity between the definition of the positive range provided by Insight Assessment (2017) and Paul and Elder's (1996) description of the "challenged thinker" who is just becoming aware of the importance of thinking. This connection may imply that, with regard to the five critical thinking dispositions, the students in the experimental and control groups were demonstrating the critical thinking indicators of the second stage of Paul and Elder's (1996) critical thinking stage theory model.

Interestingly, for the critical thinking disposition of truth-seeking, both groups scored in the inconsistent/ambivalent range (Insight Assessment, 2017) on the post-test, which is suggestive of Paul and Elder's (1996) first stage of critical thinking development: the "unreflective thinker" who does not recognize the importance of thinking. According to the test publisher, the disposition of truth-seeking involves "following reasons and evidence wherever they may lead" (Insight Assessment, 2017, p. 13). The finding that both groups were inconsistent/ambivalent with regard to the truth-

seeking disposition provides valuable guidance when planning future English

Composition II instruction. For example, in addition to the short stories that are part of

the English Composition II curriculum, students could be given real-world problems

and/or scenarios to address that would require them to gather evidence and to provide

support for their conclusions. To facilitate this type of instruction, English Composition

II instructors could incorporate the active-learning strategy of problem-based learning

(PBL) (Duch, Groh, & Allen, 2001), which has been the subject of other researchers in

the field of critical thinking (Kim, Sharma, Land, &Furlong, 2013; Tiwari, Lai, So, &

Yuen, 2006).

  Another interesting finding from the comparison of the two groups' post-test

scores was that the experimental (small-group discussion) group scored in the positive

range for the maturity of judgement disposition, whereas the control group scored in the

inconsistent/ambivalent range. The test publisher defines maturity of judgement as the

understanding "that multiple solutions may be acceptable" (Insight Assessment, 2017, p.

13). Insight into the differences between the two groups with respect to this disposition

can be gleaned from the instructor interview conducted by the researcher at the end of the

study. When asked whether she noticed a difference between the experimental and

control groups with regard to their flexibility in considering alternatives to a question, the

instructor, commenting on the experimental group, explained that "…by the time

everyone had 'think, paired, shared,' they had come to [see], not that there was one

answer, but that there … [were] a multitude of perspectives to see or understand the

meaning of the story." Reflecting the instructor's viewpoint, one of the experimental

(small-group discussion) group students, as part of a focus group interview at the end of

the treatment, commented, "I liked to see different people's ideas and opinions about the topics."

Also of interest was the finding that the experimental (small-group discussion) group experienced a significant drop (-2.82 points, $p = 0.04$) in the critical thinking disposition of analyticity; in contrast, though not significant, the control group experienced a slight increase (0.41) in this disposition from pre- to post-test. According to the test publisher, analyticity is the ability to "anticipate both the good and the bad potential consequences or outcomes of situations, choices, proposals, and plans" (Insight Assessment, 2017, p. 13).

Based on select researchers' findings regarding discussion and cooperative learning (Bertucci et al., 2010; Pollock, Hamann, & Wilson, 2011), the researcher surmised that the experimental (small-group discussion) group would demonstrate a significant increase in analyticity, and that the control (whole-group discussion) group would also experience an increase in this disposition, albeit not as large due to the differing amounts of time individuals can speak in whole-group discussions vs small-group discussions. Both groups were given the same higher-order questions that were designed to encourage them to demonstrate their understanding of the assigned stories at the top three levels of Bloom's Revised Taxonomy: analyze, evaluate, and create (Krathwohl, 2002). Many of these questions asked students to consider characters' actions and judge whether they would have responded differently to events in the stories. The researcher assumed that having regular practice in evaluating the consequences of characters' actions would develop all students' analyticity. Again, as was suggested when discussing both groups' ambivalent classification with regard to truth-seeking,

perhaps instead of employing only short stories within the English Composition II curriculum, instructors could use real-world scenarios as part of problem-based learning (PBL) (Duch, Groh, & Allen, 2001). In this way, students could improve their analyticity by considering the outcomes of real-world choices, as opposed to the choices of a character within a piece of fiction.

Another interesting finding from the paired sample t-tests was the experimental (small-group discussion) group's significant drop (-3.76 points, $p = 0.04$) in the disposition of inquisitiveness, which the test publisher defined as the "tendency to want to know things, even if they are not immediately or obviously useful at the moment" (Insight Assessment, 2017, p. 13). In fact, the experimental group moved from a pre-test classification of strong positive to a post-test classification of positive. The control (whole-group discussion) group also experienced a drop in their inquisitiveness scores (-0.35), but the decrease was not significant.

The drop in the experimental group's inquisitiveness seems to run counter to the information gathered during the instructor and student focus-group interviews. For example, in reflecting on their participation in the small-group discussion strategies, one of the experimental group students stated, "A lot of times people would bring up answers that kind of shed new light on things, and that I never would have thought of, and it kind of got me more interested about what was going on."

Similar to the student's feelings regarding the small-group discussion activities, the instructor also remarked on a marked sense of inquisitiveness on the part of the experimental group students; this curiosity was especially demonstrated when the students read the short stories together. According to the instructor, while the stories

were being read, the students in the experimental group "actually started mouthing the predictions…they were already making curious deductions based on the way the story began." The instructor observed that most of the experimental group demonstrated this sense of curiosity regarding the stories: "And it wasn't just one or two people, all of them made reactions to the story…before we even knew … the next part of the story, they were making deductions." In contrast, when observing the control group, the instructor did not notice this same sense of curiosity and eagerness to make deductions. Instead, the instructor observed that "mostly the students were sitting back and watching somebody else make the deduction."

Finally, one of the most interesting results of this study related to the control (whole-group discussion) group's pre- to post-test increase (1.35 points) on the systematicity subscale. The test's publisher defines systematicity as the ability to "approach problems in a disciplined, orderly, and systematic way" (Insight Assessment, 2017, p. 13). Although the increase was small and not significant, the control group moved from a pre-test classification of inconsistent/ambivalent to a post-test classification of positive.

The researcher postulated that the control group's experiences of addressing the higher-order questions through whole-group discussion may have had an effect on their systematicity. In the researcher's opinion, by its nature, whole-group discussion can seem more orderly than small-group discussion; as the instructor poses a question to the entire class, students must take turns to share their answers with their peers. In contrast, the small-group discussion strategies can seem less structured to the observer who would notice several groups of students interacting at once throughout the classroom. When

asked to comment on the use of the small-group discussion strategies, even the instructor commented that the students in the experimental (small-group discussion) group were "so much more free-flowing with their voices in talking to each other…" Accordingly, perhaps the more structured environment that resulted from the whole-group discussions encouraged students in the control group to react in a more orderly and systematic manner. However, again, this is only the researcher's postulation, and more research evidence would be needed to further investigate why the students in the control group experienced a slight increase in their systematicity.

Limitations

While the study yielded interesting findings that have implications for future instruction using small and whole-group discussion, several limitations impacted the study's applicability to the general population of community college students. For example, analysis of the statistical power of the two sample sizes ($n = 17$) was conducted using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009). This analysis revealed that a sample size of 21 subjects for each group was necessary for a large effect (T. Gollery, personal communication, August 17, 2017). Accordingly, if the current study's sample sizes were slightly larger, the difference in post-test CCTDI scores might have revealed different results.

The sample size may have impacted the internal consistency of the CCTDI results, as represented in Table 3. Although the alpha levels for the omnibus scores and the pre- and post-test scores were deemed acceptable, the consistency of the experimental and control groups' performance on the CCTDI was considerably lower than that of the norm group used by the test's publishers (Insight Assessment, 2017).   In addition to the

sample size, the consistency of the pre-test CCTDI scores may have been impacted by the use of intact groups for the experimental and control groups.

Furthermore, the timing of the post-test administration of the CCTDI likely influenced the post-test CCTDI scores for both the experimental and control groups. The researcher observed that students rushed through the post-test at the end of the term. Giving the CCTDI at a time when students were focused on preparations for their finals, as well as completing their last writing assignments, probably reduced student motivation to respond truthfully and thus impacted the students' post-test performance on the CCTDI.

In addition to the internal consistency of the experimental and control groups' performance on the CCTDI, the 14-week treatment may not have been sufficient time to see significant gains in critical thinking dispositions among community college students. This concern is supported by Tiwari, Lai, So, and Yuen's (2006) use of the CCTDI in their longitudinal study of the critical thinking dispositions of students enrolled in a four-year nursing program at a university in Hong Kong. Tiwari et al. administered the CCTDI to the same cohort of nursing students at four different points in their program: at the beginning of their first semester, at the end of their second semester, at the end of their first year, and at the end of their second year. Upon analyzing the students' CCTDI scores, the researchers found significant differences between students who had participated in the research treatment and those who had participated in traditional lecture-based instruction (Tiwari et al., 2006). Based on Tiwari et al.'s findings, the researcher postulates that the time period between pre- and post-test administrations of

the CCTDI might not have been sufficient to see measurable, statistically significant changes in students' critical thinking dispositions.

Combined with the 14-week treatment period, the method of critical thinking instruction may have also affected the students' development of critical thinking dispositions as measured by the CCTDI. In the current study, critical thinking was implicitly taught through the use of small-group or whole-group discussion of higher-order questions, which several researchers assert can lead to increased critical thinking skills (Crawford, 2005; Tofade, Eisner, & Haines, 2013). However, Paul and Elder (1996) asserted that critical thinking skills and dispositions should be explicitly taught. Paul and Elder's viewpoint regarding explicit critical thinking instruction is supported by Heijltjes, Gog, and Paas (2014), whose comparison of implicit and explicit critical thinking treatments indicated that students participating in treatment conditions involving explicit critical thinking instruction scored significantly higher on a researcher-created critical thinking instrument than students participating in treatments involving implicit critical thinking instruction. The results of this study confirm this need for explicit instruction of critical thinking to influence critical thinking dispositions.

Another possible limitation of the study that impacted the results may have been the age of the students in the experimental and control groups. The mean age was not computed due to the influence of outliers. However, the mode for the experimental group was 18 years of age, and the mode for the control group was 19 years of age. Therefore, a large number of students in the current study were probably operating at lower levels of Paul and Elder's (1996) critical thinking developmental model, thus affecting their critical thinking disposition scores on the CCTDI.

From an instructional standpoint, the most intriguing possible reason for the lack of significant differences between the two group's CCTDI scores may be that, despite Pollock et al.'s (2011) findings that students perceive differing benefits from small-versus whole-group discussion, type of discussion (small- versus whole-group) does not have an impact on directly-measured critical thinking dispositions. As asserted by Resnick, Asterhan, and Clark (2015), beneficial classroom discussion can be facilitated through whole groups, small groups, and pairs. The most important element of discussion is the engagement and collaboration between and among students who are working together on the same task (Resnick, Asterhan, & Clark, 2015). The possibility that multiple forms of discussion (small- and whole-group) of higher-order thinking questions can benefit students provides instructors with a variety of options when planning critical thinking instruction that crosses disciplines.

Professional Implications of Study

The current study compared the impact of small-group discussion of higher-order thinking questions to the impact of whole-group discussion of higher-order thinking questions with regard to the development of community college English Composition II students' critical thinking dispositions. At the conclusion of the study, no significant differences were found between the directly measured critical thinking dispositions of students who discussed higher-order thinking questions in small groups and students who discussed higher-order thinking questions with the entire class (whole-group).

One of the small group discussion strategies used in the current study was the "think, pair, share," technique, as described in Kaddoura's (2013) study of nursing students. In her research, Kaddoura found that there was a significant difference in

scores on the "Health Education Systems, Inc." (HESI) (p. 3) critical thinking exam between the nursing students who participated in the strategy and the students who did not receive the treatment. While the current study did not find a significant difference between the directly measured critical thinking dispositions of students who participated in small-group discussion strategies, including the "think, pair, share," and students who participated in whole-group discussion, qualitative data from the instructor interview supported the use of the strategy in the classroom. Specifically, during the interview, the instructor noted that the "think, pair, share" activity "allowed nontraditional students, older students, women, to give a perspective…of what they know." Commenting further on the strategy, the instructor stated, "Those 'think, pair, shares' allowed multiple knowledges to come together….So I like the 'think, pair, share' because our students, they get one opinion out of me, or a variety of opinions about what may be going on, but the students pick up on things that I may have missed…"

All four of the small-group discussion strategies used in the current study required students to work in small groups to address a higher-order thinking question. Two of the strategies, "think, pair, share" (Kaddoura, 2013) and "quick write" (Himmele, P., & Himmele, W., 2011), required students to work in groups of two; the "Roundtable Writing" and "I Say Review" (Kaufman & Wandberg, 2010) strategies required students to work in groups of four. In their study of 208 graduate and undergraduate students, Lumpkin, Achen, and Dodd (2015) also investigated the benefits of small-group instruction on students' learning. The researchers administered a questionnaire to gather data on the students' perceptions of the benefits of several course activities, such as working in pairs to review the main points from the instructor's lecture (Lumpkin et al.,

2015). The authors' analyses of the frequency data revealed that undergraduates found the small group work to be "often helpful" (35%) and "sometimes helpful" (54%) (Lumpkin et al., 2015). In addition, the graduate students in the study found the paired work to be "often beneficial" (44%) and "sometimes beneficial" (52%) (Lumpkin et al., 2015).

The qualitative data collected in the current study supported Lumpkin, Achen, and Dodd's (2015) finding that many students perceived a benefit of working in small groups. For example, during the focus group interview with the experimental (small-group discussion) group, one of the students commented that the small-group discussion activities helped her feel more confident in addressing questions by allowing her to "share with your peers, like one-on-one, instead of in front of the class because then you can bounce your ideas off of them, and they can help contribute…" Interestingly, when asked about addressing questions as part of whole-group discussion, a student from the control (whole-group discussion) group also pointed to the benefits of small-group discussion: "I think sometimes it's better to talk … in smaller groups because some people don't like to talk in front of a lot of people."

Finally, the researcher proposes that one of the most important implications that can be drawn from the current study is the necessity of training college faculty on methods for explicitly teaching critical thinking skills and dispositions. As previously mentioned, in the current study, critical thinking was implicitly taught through the use of higher-order questions during small-group and whole-group discussion. Current literature suggests that many college instructors struggle with explicit instruction of critical thinking skills (Panettieri, 2015; Shim & Walczak, 2012). According to Nicholas

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and Raider-Roth (2016), many instructors implicitly teach critical thinking through the delivery of instructional content. Interestingly, Gul et al.'s (2014) study of the effectiveness of teacher training on the use of higher-order questions suggests that even teacher training in an implicit method of critical thinking instruction does not lead to increased critical thinking instruction in the classroom. The current researcher suggests that faculty training on the most effective methods of explicit critical thinking instruction could have a positive impact on students' development of critical thinking skills and dispositions within the community college environment.

Recommendations for Future Research

In the current study, the research hypothesis was rejected due to non-significant differences between CCTDI post-test scores of the experimental (small-group discussion) and control (whole-group discussion) groups. However, the review of the CCTDI performance for both groups did lead to valuable insights that can be applied to future instruction. Additional perspectives on the impact of small-group discussion versus whole-group discussion of higher-order questions were gleaned from the instructor and focus group interviews.

Follow-up research comparing the impact of small-group discussion of higher-order thinking questions and whole-group discussion of higher-order thinking questions with regard to college students' critical thinking dispositions could be strengthened by making adjustments to the current study. To begin, the analysis of the statistical power of the two samples using the G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009) revealed that the sample sizes ($n = 17$) were not sufficient to achieve a large effect. The researcher used one section of an English Composition II course as the experimental

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(small-group discussion) group and another section, which was taught by the same instructor and met on the same days of the week, as the control (whole-group discussion) group. The decision to use only two sections of the course was made in order to keep the two groups "as equivalent as possible" (Gay, Mills, & Airasian, 2012, p. 270). However, in order to increase sample sizes, future research should include other sections of the course taught by the same instructor, regardless of meeting time or day of the week.

Another improvement of the current study would be a longer time period between the pre- and post-test administrations of the CCTDI. In the current study, the pre-test CCTDI administration was given at the beginning of the spring 2017 semester, and the post-test CCTDI was given 16 weeks later, at the end of the semester. Future research using the CCTDI could follow Tiwari, Lai, So, and Yuen's (2006) example of administering the CCTDI at several points within an entire academic program as part of longitudinal research. However, to help ensure that other variables are held constant, it would be best to perform the longitudinal study with a cohort in the same academic program, similar to Tiwari et al's research with a nursing cohort. Alternatively, a different measure of critical thinking dispositions could be employed that might be more appropriate for use during a shortened pre-test/post-test period.

Future research could also examine the impact of small-group versus whole-group discussion in other content areas. During the interview, the English Composition II instructor commented that the students in both the experimental and control groups were reading "literature that is a century old or a century plus old." The researcher suspects that the students in both the experimental and control groups may have experienced difficulty in relating to the materials, thus resulting in both groups' classification of

inconsistent/ambivalent (Insight Assessment, 2017) on the truth-seeking disposition. To parse out the effects of the curriculum on the experimental and control groups' CCTDI performance, future research should compare the CCTDI scores of English Composition II students who participate in small- and whole-group discussion of higher-order questions to the CCTDI scores of students in other courses who participate in small- and whole-group discussion of higher-order questions.

Finally, another avenue for future research could be the relationship between discussion and students' development of critical thinking skills and dispositions within two different types of instructional environments: online courses and face-to-face courses. As noted in the review of recent literature, several studies have found evidence of students' critical thinking within online discussion forums (Belcher et al., 2015; Williams & Lahman, 2011). Other studies have found possible relationships between students' critical thinking and their participation in discussion groups within face-to-face courses (Pollock, et al., 2011). The current researcher suggests that future research comparing discussion that occurs in online discussion forums to discussion that occurs in face-to-face courses is necessary to parse out the effects of the discussion environment on the development of students' critical thinking skills and dispositions.

Finally, the researcher recommends that future research should focus on studies of actual student time-on-task during student discussions, whether in small or large groups. This type of evidence, coupled with guidelines and suggestions for instructors to maximize time-on-task during discussion, would provide rich, useful information for instructors in higher education, adult education, and K-12 education. The relationship

between time-on-task during discussion and measurable student achievement of instructional objectives is another exciting venue for future researchers.

Significance of the Study

The current study sought to compare the impact of small-group discussion of higher-order thinking questions to the impact of whole-group discussion of higher-order thinking questions with regard to the critical thinking dispositions of students enrolled in an English Composition II course at a community college in the Southeast. There were no significant differences between the two types of discussion of higher-order questions on critical thinking dispositions after 14 weeks' intervention.

The current study provides further insight into the issue of improving the critical thinking skills and dispositions of community college students. Professionals working in higher education can benefit from research on pedagogical approaches that may improve critical thinking skills and dispositions. In particular, the instructional use of discussion, which was the focus of the current study, warrants additional research with regard to its possible impact on students' critical thinking skills because discussion, whether small- or whole-group, can be easily integrated into existing curricula and pedagogy, regardless of discipline, and requires little outside preparation on the part of instructors. Further research regarding the impact of discussion on the critical thinking dispositions of college students will serve to enlighten instructors and theorists on this important topic.

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APPENDICES

Appendix A
Demographic Survey

(Used by the researcher with both the experimental and control groups at the beginning of

the semester)

Name: _____   Gender: _____

1. How old are you? _____

2. What is your college major? _____

3. What is your current cumulative GPA? _____

4. Is this your first time at any college? _____

5. Have you ever taken English Composition II before? _____

6. What was your grade in English Composition I? _____

7. What were your strengths in English Composition I? Check all that apply:

☐ grammar/sentence structure   ☐ punctuation   ☐ using supporting ideas

☐ organization of ideas   ☐ word choice   ☐ editing/revising

8. What do you feel you need to practice in English Composition II? Check all that apply:

☐ grammar/sentence structure   ☐ punctuation   ☐ sentence fluency

☐ organization of ideas   ☐ word choice   ☐ editing/revising

Appendix B

Focus Group Interview Questions for Experimental Group

(Used by the researcher)

1. What did you think about the "think, pair, share," "quick write," "roundtable writing," and "I Say Review" activities that we did in class this semester?

2. Prior to this class, had you ever participated in these strategies before?

3. Do you think the strategies helped you to feel more self-confident when considering an answer to your instructor's questions?

4. Did the strategies increase your interest about the topics covered in class?

5. Did working with a partner or small group affect your open-mindedness regarding other people's views?

Appendix C

Focus Group Interview Questions for Control Group

(Used by the researcher)

1. What did you think about the whole-class discussion activities that you did in class this semester?

2. Do you think the whole class discussions helped you to feel more self-confident when considering an answer to your instructor's questions?

3. Did the whole-class discussions increase your interest about the topics covered in class?

4. Did the whole class discussions affect your open-mindedness regarding other people's views?

Appendix D

Instructor Interview Questions

(Used by researcher during instructor interview)

1. What did you think about using the "think, pair, share," "quick write," "roundtable writing," and "I Say Review" activities during instruction this semester?

2. Did you notice a difference in clarity of thought between members of the experimental and control groups?

3. Did you notice a difference between the experimental and control group with regard to their flexibility in considering alternative answers to a question?

4. With regard to essays, did you notice a difference between the experimental and control groups' ability to organize their thoughts when responding in written form?

5. Did you notice a difference between the experimental and control group with regard to their curiosity about the topics covered in class?

6. Did you notice a difference between the experimental and control group with regard to their open-mindedness regarding other people's views?

7. Did you notice a difference between the experimental and control groups in their essays with regard to their persistence in finding the answers to difficult questions?

8. Was there a difference in overall persistence regarding finishing an assignment?

9. Was there a difference in open-mindedness in their writing?

Appendix E

Implementation Checklist for Active Learning Strategies in Experimental Group

Week	Date	Story	Question/Prompt	Experimental Strategy	Control Strategy
2	1/18/17	"Tell-Tale Heart"	How do the narrator's claims that he is not mad differ from his actions?	Think, Pair, Share	Whole-group discussion
3	1/25/17	"Everyday Use"	How do Dee and her mother differ in their views of the quilts?	Quick Write	Whole-group discussion
4	2/1/17	"The Necklace"	Evaluate Mathilde's solution to losing the necklace. What could she have done differently?	Roundtable Writing	Whole-group discussion
5	2/8/17	"The Story of an Hour"	Critique Mrs. Mallard's response to her husband's death. How would you judge her feelings of "monstrous joy?"	I Say Review	Whole-group discussion
6	2/15/17	"The Yellow Wallpaper"	John calls his wife "little goose." Based on events in the story, interpret the possible meaning behind his name for her.	Think, Pair, Share	Whole-group discussion
7	2/22/17	"The Lottery"	Much of the ritual for the lottery had been forgotten and discarded. Hypothesize why the villagers would still continue the practice when other villages had stopped.	Quick Write	Whole-group discussion
8	3/1/17	"Young Goodman Brown"	Goodman Brown exclaims that he lost his Faith. Interpret the various meanings of his statement.	Roundtable Writing	Whole-group discussion
9	3/8/17	"A Clean, Well-Lighted Place"	Compare the waiters' attitudes toward the old man. Hypothesize each man's reasons for his opinion.	I Say Review	Whole-group discussion
10	3/22/17	"The House on Mango Street"	Evaluate the nun's reaction to the author's house. Should she have responded differently?	Think, Pair, Share	Whole-group discussion

11	3/29/17	"The Things They Carried"	Assess Lieutenant Cross's guilt over Lavender's death. Based on the events of the story, were his feelings justified?	Quick Write	Whole-group discussion
12	4/5/17	"Road Not Taken"	Predict what might have happened if the author had taken the other road.	Roundtable Writing	Whole-group discussion
13	4/12/17	"One Art"	Interpret the poet's meaning behind the line, "The art of losing isn't hard to master."	I Say Review	Whole-group discussion
14	4/19/17	"A Rose for Emily"	Analyze the relationship between Emily and the townspeople. How did that relationship impact the end of the story?	Think, Pair, Share	Whole-group discussion
15	4/26/17	"A&P"	Evaluate Sammy's reaction to Lengel's treatment of the three girls. Should he have handled the situation differently?	Quick Write	Whole-group discussion

Oral Consent Script for Demographic Survey and CCTDI Pretest

(to be read by student researcher)

<u>Explanation of Research:</u>

Good morning. My name is Mechel Albano; I'm a doctoral student at Southeastern University in Lakeland, Florida. As part of the requirements for my degree, I will be conducting research to gather information on the critical thinking tendencies of college students. Today, I am asking you to complete a very short demographic questionnaire and a critical thinking survey. The demographic questionnaire consists of eight questions and should take no more than five minutes to complete. The critical thinking survey consists of several statements; you will indicate whether you agree or disagree with each statement. Overall, the survey will take no more than 30 minutes, and many of you may finish within 20 minutes. At the end of the semester, we'll take the survey again. During that time, I will also invite you to participate in an hour-long focus group where we will discuss your experiences with class activities over the semester and your tendencies to think critically. I will use the survey results and focus group information as part of my research on improving instruction for college students.

<u>Confidentiality:</u>

Your participation in my research is completely voluntary and is not part of any course requirements. Your responses to the questionnaire and surveys will be kept strictly confidential and will not affect your course grade in any way. In addition, this survey is completely voluntary and is not part of any course requirements. Access to the data will be limited to me, the student researcher. Your instructor will not see any of your responses. If requested, de-identified data may be provided to the HCC Institutional Review Board staff who have oversight responsibilities for this research.

Your responses will be compiled as part of a group report; therefore, no results will be individually identifiable. When I complete my research report, I will not use student names, the name of the instructor, or the name of the college.

If you have any questions or concerns, please feel free to contact me at mmalbano@seu.edu. You can also reach me on my cell at 813-453-6387. Thank you so

much for helping me with my research project. The information you provide will help to improve college instruction by providing a clearer picture of students' habits regarding the use of critical thinking.

Appendix G

Oral Informed Consent Script for CCTDI Post-test and Focus Group
(to be used by student researcher)

Purpose of CCTDI Post-test and Focus Group:

Good morning. My name is Mechel Albano. I'm a doctoral student at Southeastern University in Lakeland, Florida. When I visited your class at the beginning of the semester, I told you about my research on college students' critical thinking tendencies. You completed a brief demographic questionnaire and a critical thinking survey. Today, I will be giving you that same survey again. Overall, the survey will take no more than 30 minutes, and many of you may finish within 20 minutes. I will be comparing the two surveys to determine if your opinions on critical thinking have changed during the semester.

Before we begin the survey, I would like to have a brief discussion regarding some of the activities that were used in your English Composition II class. I am asking for volunteers to share their opinions on how these activities affected the way they developed answers to questions that the instructor asked in class. Specifically, the questions I will be asking will help me better understand whether the activities influenced your tendency to think critically. These tendencies include persistence, focus, and curiosity. I will be combining the information from these questions with the survey results to develop a better understanding of the use of critical thinking by college students.

During the discussion, I would like to digitally record our conversation, so that I can get your words accurately. If at any time during our discussion you feel uncomfortable answering a question, please let me know, and you don't have to answer it. Also, if you want to answer a question but do not want your response recorded, please let me know and I will turn off the recorder.

Before beginning the discussion, I will ask you if you agree to participate and talk to me about your tendencies to use critical thinking skills while answering questions during

your English Composition II course. I will also ask you if you agree to be digitally recorded. You may withdraw your consent to participate at any time without consequence.

After our discussion, I will transcribe the recording with no identifying information. I will keep the digital recorder locked in a secure drawer in a filing cabinet. The recording will be erased at the end of my research project.

Confidentiality:

Your participation in the survey and discussion is completely voluntary. Your responses on the survey and during the discussion will be kept strictly confidential and will not affect your final course grade in any way. Access to the survey and discussion results will be limited to me, the student researcher. Your instructor will not see the results of the survey or your discussion responses. If requested, de-identified data may be provided to the HCC Institutional Review Board staff who have oversight responsibilities for this research. At any time during the survey or discussion, you may choose not to participate.

In addition, all data will be compiled as part of a group report; therefore, no responses will be individually identifiable. When I complete my research report, I will not use student names, the name of the instructor, or the name of the college.
If you have any questions or concerns, please feel free to ask me at any time during the survey or discussion. You may also email me at mmalbano@seu.edu or call me on my cell at 813-453-6387.

Thank you so much for assisting me with my research project. The information gathered during this research will help to improve college instruction by providing a clearer picture of students' habits regarding the use of critical thinking.

Appendix H

Oral Informed Consent Script for Instructor Interview

(to be used by student researcher prior to instructor interview)

Purpose of Interview:

I would like to get your opinion on the active learning strategies that you used with the experimental group. I also want to ask you some questions regarding your observations on any differences between the experimental and control groups with regard to critical thinking dispositions.

Confidentiality:

During our interview, please feel free to share your opinions regarding your experiences teaching the experimental and control groups. Your responses will be kept completely confidential. Access to the interview results will be limited to me, the student researcher, in fulfillment of HCC's Institutional Research Board requirements. I will not use any names in my dissertation, and I will not identify the name of the college. In addition, at any time during our interview, you may choose to not participate.

Thank you so much for participating in this interview. Your responses will help me better understand active learning strategies and critical thinking.