

**The Effect of Reflective Writing Interventions on Critical Thinking Skills
and Dispositions of Baccalaureate Nursing Students**

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Jessica L. Naber

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Abstract

The importance of critical thinking as an outcome for students graduating from undergraduate nursing programs is well-documented by both the American Association of Colleges of Nursing (AACN) and the National League for Nursing (NLN). Graduating nurses are expected to apply critical thinking in all practice situations to improve patient health outcomes. Reflective writing is one strategy used to increase understanding and ability to reason and analyze. The lack of empirical evidence regarding the effectiveness of reflective writing interventions on increasing critical thinking skills supports the need for examining reflective writing as a critical thinking strategy. The purpose of this study was to test the effectiveness of a reflective writing intervention, based on Paul's model of critical thinking, for improving critical thinking skills and dispositions in baccalaureate nursing students during an eight-week clinical rotation. The design for this pilot study was an experimental, pretest-posttest design. The sample was a randomly assigned convenience sample of 70 baccalaureate nursing students in their fourth semester of nursing school at two state-supported universities. All participants were enrolled in an adult-health nursing course and were completing clinical learning experiences in acute care facilities. Both groups completed two critical thinking instruments, the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Dispositions Inventory (CCTDI), and then the experimental group completed a reflective writing intervention consisting of six writing assignments. Both groups then completed the two tests again. Results showed a significant increase ($p=0.03$) on only the truthseeking subscale on the CCTDI for the experimental group when compared to the control group. Some other slight differences on subscale scores could be accounted for by the institution, age, ethnicity, and health care

experience differences between the control and experimental groups. Strengths of this study included the innovative intervention and the convenient format of intervention administration, completion, and submission. Limitations of the study included institutional differences, the eight-week commitment, and the lack of control of some aspects of the study environment. Evaluation of the qualitative data, replication in a larger sample, inclusion of different levels of students, and alternative design of assignments are all areas for future research.

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LIST OF ABBREVIATIONS AND SYMBOLS

ABBREVIATIONS	PAGE
1. American Association of Colleges of Nursing (AACN)	1
2. American College Testing (ACT)	80
3. American Philosophical Association (APA)	5
4. Analysis of Covariance (ANCOVA)	60
5. Analysis of Variance (ANOVA)	17
6. Associates Degree in Nursing (ADN)	6
7. Bachelors of Science in Nursing (BSN)	6
8. Brigham Young University (BYU)	30
9. California Critical Thinking Dispositions Inventory (CCTDI)	4
10. California Critical Thinking Skills Test (CCTST)	4
11. College of Nursing (CON)	30
12. Critical Thinking Scale (CTS)	41
13. Cumulative Index to Nursing and Allied Health Literature (CINAHL)	14
14. Education Resources Information Center (ERIC)	14
15. Graduate Record Examination (GRE)	53
16. Institutional Review Board (IRB)	49
17. Kentucky Board of Nursing (KBN)	2
18. Large Four-Year Primarily Residential (L4/R)	47
19. Large Four-Year Primarily Non-residential (L4/NR)	47

20. Multivariate Analysis of Covariance (MANCOVA)	60
21. National Assessment Program—Literacy and Numeracy (NAPLAN)	28
22. National College Licensure Exam (NCLEX)	2
23. National Council of State Boards of Nursing (NCSBN)	13
24. National League for Nursing (NLN)	1
25. Office of Institutional Effectiveness, Planning, and Research (OIEPR)	66
26. Office of Institutional Research and Assessment (OIRA)	66
27. Physical Therapy (PT)	15
28. Registered Nurse (RN)	21
29. Scholastic Aptitude Test (SAT)	53
30. Six Subgroup Quality Scale (SSQS)	88
31. Statistical Package for the Social Sciences (SPSS)	60
32. Writing Across the Curriculum (WAC)	26
33. Writing to Learn (WTL)	31

Chapter I: Introduction

For decades, the concept of critical thinking has been recognized as an essential outcome for students at all levels and in all disciplines (Reed & Kromrey, 2001). Critical thinking is generally thought of as a process of analyzing, synthesizing, and/or evaluating information (Paul & Scriven, 1987, p. 1). The American Association of Colleges of Nursing (AACN) has publicized the importance of critical thinking as an outcome for students in undergraduate nursing programs. The AACN's *Essentials of Baccalaureate Education for Professional Nursing Practice* (2008) is a guideline for the education of baccalaureate nurses, and this document emphasizes the importance of graduating nurses applying critical thinking in all practice situations, regardless of complexity, in order to improve patient health outcomes. The National League for Nursing's (NLN) Core Competencies of Nurse Educators states that, to facilitate learning effectively, nurse educators must "create opportunities for learners to develop their critical thinking...skills" (NLN, 2005). In addition, critical thinking has been reported as the most common concept emphasized in nursing curricula (McEwen & Brown, 2002).

Critical thinking is an important concept in nursing curricula because, when in practice, nurses need to analyze a patient's situation and make a determination of the appropriate nursing action. Nurses need to consider patients' feelings and circumstances when making decisions. They must be able to recognize that other treatments or interventions might be more appropriate, so they may seek out and implement an alternative. They must react cautiously and efficiently to patient needs. All of these actions taken by nurses include elements of critical thinking, and all of these actions affect patient health outcomes.

In addition to preparing safe, competent practitioners who can prevent poor patient outcomes, nursing administrators and faculty at schools of nursing are particularly interested in

critical thinking skills because of the relationship between critical thinking and passing the NCLEX-RN. For example, in a recent study of 218 baccalaureate nursing students in the United States, students who passed the NCLEX-RN scored significantly higher on critical thinking tests than students who failed that examination (Giddens & Gloeckner, 2005). Educators and administrators are also concerned about NCLEX-RN pass rates because there is a nursing shortage. In addition, nursing schools obtain state board approval based on NCLEX-RN pass rates. For example, Kentucky's approval pass rate is 85% (Kentucky Board of Nursing [KBN], 2010). In order to graduate students who are safe and competent practitioners, and to have better NCLEX-RN outcomes to decrease the shortage and maintain operation of nursing schools, it is imperative that nursing faculty provide opportunities for students to develop their critical thinking skills.

This chapter is an introduction to reflective writing as a strategy to promote critical thinking and briefly reviews aspects of the study such as the purpose of the study, concepts, and the theoretical framework. The chapter concludes with an explanation of my assumptions.

Background

Several pedagogical strategies are mentioned in the literature for teaching critical thinking to undergraduate students. Writing is frequently discussed as a critical thinking teaching strategy, and reflective writing is a specific technique mentioned in the literature. For example, McGuire, Lay, and Peters (2009) described reflective papers they assigned to students in their classes. The students were directed to focus on specific activities, like readings, clinical experiences, or group activities, and write about what they learned from the activities. Students were then asked to evaluate the reflective writing process. Seven themes were identified in the students' responses: 1) active participation, 2) dialogue with instructor, 3) critical thinking,

4) interconnections of theory to practice, 5) self-awareness, 6) improving writing skills, and 7) concerns of grading. Overall, six of these seven themes indicated that students found value in the reflective writing assignments. More examples from professional literature focusing on the strategy of reflective writing will be in chapter two.

As an educator in a baccalaureate nursing program, I realize that critical thinking skills are essential for practicing nurses; therefore, the significance of students developing critical thinking skills while in undergraduate nursing programs cannot be underestimated. In my first year of teaching, I was challenged to identify teaching strategies that fostered critical thinking in nursing students. While reviewing educational and health care literature from the past few decades, I discovered that writing is used to help students analyze, synthesize, and integrate their experiences and, therefore, transforms their learning. For this reason, I proposed here to investigate a reflective writing intervention as a strategy to improve students' critical thinking skills.

Definitions of Terms

Critical Thinking

Although critical thinking has been studied for decades, the concept is difficult to limit to a single definition (Reed & Kromrey, 2001). There is no consensus on the definition of critical thinking in nursing education (Thompson & Rebesch, 2000). For this study, the definition of critical thinking stated by Paul and Scriven (1987) will be used. According to Paul and Scriven, critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. (p. 1)

They state that critical thinking is based on intellectual standards that appear among disciplines, namely the ten standards mentioned in the model described later: clarity, accuracy, relevance, logic, breadth, precision, significance, completeness, fairness, and depth. Critical thinking also involves examining the “elements of thought that are implicit in all reasoning.” These are the eight elements listed in the model: purpose, question, points of view, information, inferences, concepts, implications, and assumptions (Paul & Scriven, 1987).

Critical thinking involves scientific, mathematical, historical, anthropological, economic, moral, and philosophical thinking. The two components of critical thinking are as follows: having information and skills at processing information and generating beliefs and the habit of using those skills to guide behavior. This is opposed to acquiring and retaining information, possessing skills without using them, or using skills without accepting the results (Paul & Scriven, 1987).

Paul and Scriven (1987) argue that no person is a universal critical thinker. All persons have episodes of irrational thought, so critical thinking is a matter of degree and dependent on experience with critical thinking. Because of this fact, development of critical thinking skills may be a lifelong process.

According to Paul and Elder (2008), the ideal critical thinker raises important questions in a clear and precise manner; gathers and assesses essential information and interprets it appropriately; comes to relevant conclusions and finds solutions; thinks open-mindedly with attention to assumptions, alternative viewpoints, and implications; and communicates well with others to find solutions. In order to quantitatively measure critical thinking, Facione’s California Critical Thinking Skills Test (CCTST) (1990c) and California Critical Thinking Dispositions Inventory (CCTDI) (1994) were administered to junior-level baccalaureate nursing students at

the beginning and end of their spring semester nursing clinical rotation. Further description of this instrument can be found in Chapter 3.

Critical Thinking Disposition

Critical thinking disposition, a term originated by the American Philosophical Association's (APA) Delphi Report (Facione, 1990a), is the affective dimension of critical thinking. According to Paul (1996) critical thinking disposition includes valuable intellectual traits, such as fair-mindedness and intellectual humility, which people develop as they become ideal critical thinkers. Both critical thinking skills and critical thinking disposition are important pieces of developing critical thinking ability (Facione, Facione, & Sanchez, 1994). In order to quantitatively measure critical thinking disposition, Facione and colleagues' CCTDI (1994) was administered to junior-level baccalaureate nursing students at the beginning and end of their nursing clinical rotation during the spring semester. Further description of this instrument can be found in Chapter 3.

Reflective Writing

The writing process can lead to the development of thinking and learning and understanding of classroom and/or clinical content. For writing to be beneficial to students, they must comprehend the subject matter being written about as a result of the writing process (Kataoka-Yahiro & Saylor, 1994; McCabe, 1994). Experiences from the clinical setting are ideal for building critical thinking skills if reflection is used as a teaching tool. Reflecting on clinical experiences develops critical thinking ability, fosters self-understanding, facilitates coping, and leads to improvement in clinical practice (Craft, 2005; Kennison, 2006). Reflective writing as a pedagogical strategy allows students to integrate their thoughts and experiences with didactic material to more adequately understand both the experiences and the didactic material (McGuire

et al., 2009). For this study, reflective writing was defined as an assignment that is focused on an activity that students have experienced, such as class readings, clinical rotations, or group activities, that highlights what the student learned from the activity (McGuire et al.). The reflective writing assignments in this study were not measured, although the researcher provided feedback to the student.

Statement of the Problem

The importance of critical thinking as an outcome for students graduating from undergraduate nursing programs is well-documented. Simply providing content to nursing students, such as the scientific method or steps in the nursing process, does not produce problem-solving and analytical skills during patient interactions or teach reflection on or evaluation of interactions after they have occurred (McGuire et al., 2009). In addition, published research shows evidence that individuals in certain levels within nursing programs (such as junior or senior) have higher critical thinking scores than individuals in other levels (such as freshman or sophomore) (McCarthy, Schuster, Zehr, & McDougal, 1999), and students in specific degree levels in nursing education (such as BSN) had higher critical thinking scores than individuals in other degree tracks (such as ADN) (Shin, Jung, Shin, & Kim, 2006). However, very little explanation exists for the differences and what teaching strategies effect these changes. Writing, and more specifically, reflective writing, is one strategy used by educators to increase understanding and ability to reason and analyze (Kennison, 2006). The lack of empirical evidence regarding the effectiveness of reflective writing interventions on increasing critical thinking skills supports the need for examining reflective writing as a critical thinking strategy.

Purpose of the Study

The purpose of this study was to test the effectiveness of a novel reflective writing intervention, based on Paul's model of critical thinking, for improving critical thinking skills and dispositions in baccalaureate degree nursing students over the period of an eight-week clinical rotation.

Hypothesis

Baccalaureate nursing students' critical thinking skills and dispositions will increase following an eight-week reflective writing intervention when compared to the no-intervention control group when controlling for previous health care experience.

Significance to Health Sciences and Nursing

Nurses must consider a patient's situation and make a determination of the appropriate nursing action. Nurses must possess the skills necessary to consider each patient's unique feelings and circumstances when making decisions, and they must recognize when other treatment or decision options might be more appropriate. They must be able to keep up with the pace of knowledge development. All of these actions require the ability to think critically. In order to be safe and competent practitioners, nurses must be able to think critically (Kataoka-Yahiro & Saylor, 1994). Evidence in the literature establishes a link between NCLEX-RN pass rates and critical thinking (Giddens & Gloeckner, 2005). Nursing students who are taught critical thinking skills are more likely to pass the NCLEX-RN and fill nursing positions, resulting in a decrease in the national nursing shortage. Therefore, it is imperative that nursing faculty work to increase the critical thinking ability of nursing students.

The overall objective was to determine if reflective writing assignments increased critical thinking skills and disposition in baccalaureate nursing students. Currently, there is very little

empirical evidence regarding the effectiveness of reflective writing interventions on critical thinking skills and disposition. With the completion of this study, there is now evidence of the effect of reflective writing on critical thinking.

Theoretical Framework

Paul's model for critical thinking was the guiding framework for this study. This model has its roots in both philosophical and psychological approaches to critical thinking (Paul & Scriven, 1987). The model centers around three aspects of thinking: elements of good reasoning, intellectual standards used to assess quality of thinking, and intellectual traits or dispositions. Included in the good reasoning aspect, Paul mentions eight elements necessary for any reasoning process: the purpose of the thinking; the question or problem to be solved; information such as data and observations; inferences, interpretations, or solutions; concepts such as theories or definitions; assumptions; implications or consequences; and point of view or frame of reference (Paul, 1993; Reed & Kromrey, 2001). Elements of reasoning are shown in Figure 1 below.

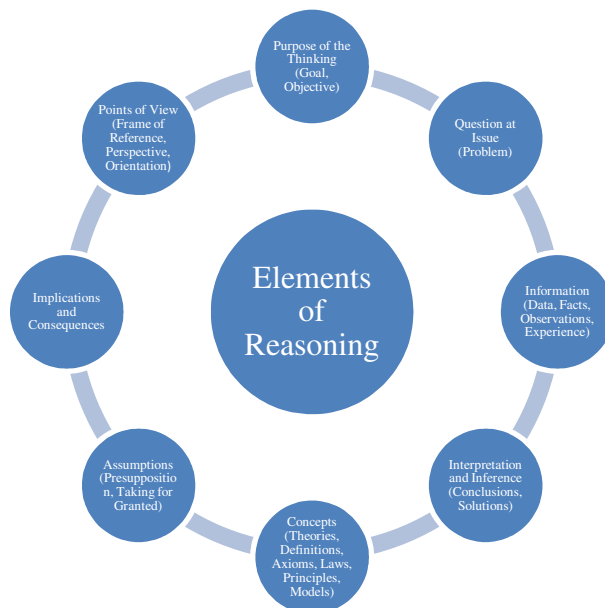


Figure 1: Elements of Reasoning (recreated from www.criticalthinking.org)

Problems that students encounter can be examined at any point on this wheel and in any order, although for the purposes of this discussion, I will begin with “Purpose of the Thinking” and continue clockwise. When students reason, they reason to achieve an objective or fulfill a need. The goal needs to be realistic and not contradict any other goals. Next, students must identify the problem that needs to be solved or the questions that need to be answered. Students must know the information that is available to them, including data, facts, observations, and experience in order to solve a problem effectively. The next step for students is to make appropriate interpretations and inferences to draw conclusions and give meaning to data. Students need to reason in steps, where they say, “Because of x, y will happen.” Reasoning is also expressed through and shaped by concepts, including theories, principles, axioms, and rules. A student who was thinking critically would identify these when reasoning. Assumptions are those aspects of reasoning that are taken for granted, and students should be able to identify and articulate their assumptions clearly and consistently. Students need to understand the implications and consequences of their reasoning. Finally, students should be able to clearly state their points of view and consistently use that point of view (Paul, 2007).

Paul calls attention to intellectual standards that are necessary for evaluating critical thinking. He says these standards must be applied whenever a student wants to verify the quality of his/her reasoning about any problem, issue, or situation. According to Paul, to think critically involves having command of these standards: clarity, accuracy, precision, relevance, depth, breadth, logic, and fairness. Clarity is crucial for critical thinking. Statements or answers must be clear, understandable, and accurate in order for the meaning to be grasped. Students should be able to defend their statements’ truth, and statements should be free from any distortion. In addition to being clear and accurate, the statements should also be precise, with enough detail

and specificity to make them easy to understand. The statements should be relevant, meaning they are connected to the question at hand. The answers to the questions should also have depth, addressing all problems in the question and all complexities. The answers should also have breadth, meaning all points of view are considered, which indicates the answers are fair and complete. The answers should be logical, make sense, and mutually support one another. Statements should also be significant, meaning they are focused on what is important, not what is trivial. Finally, statements should also be fair, meaning they are not self-serving or one-sided. These standards are not in order of importance, although it is possible to have some of the standards without having others. All are necessary, according to Paul, to show evidence of critical thinking (Paul, 2007).

Paul discusses the affective, or dispositional component of critical thinking. The affective component addresses development of traits of the reasoning mind such as intellectual humility, intellectual autonomy, intellectual integrity, intellectual courage, perseverance, confidence in reason, intellectual empathy, and fair-mindedness (Paul, 1996; Reed & Kromrey, 2001). The elements of reasoning should be used as students learn to develop the affective component of critical thinking. Figure 2 below includes each trait and examples of how students could use those traits (Paul, 1996).

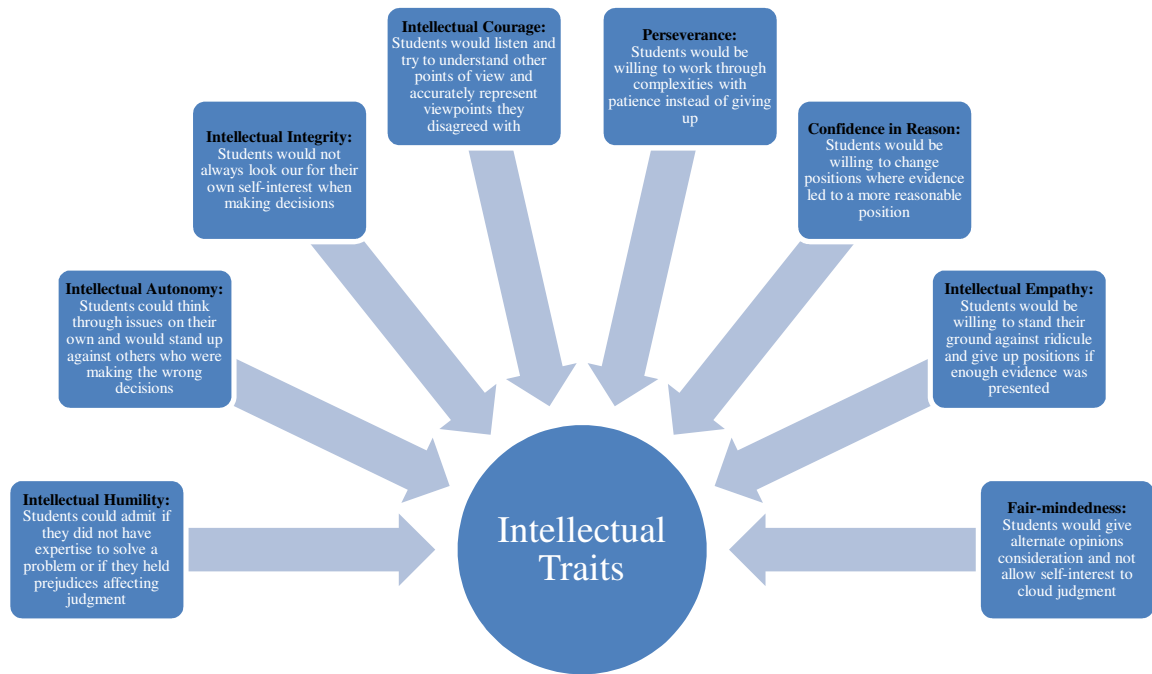


Figure 2: Intellectual Traits (recreated from www.criticalthinking.org)

The elements of thought enable students to analyze their thinking. The intellectual standards are used to assess and evaluate the elements. The intellectual traits are dispositions of mind which embody the critical thinker. To be able to think critically, students must have command of these three dimensions and apply them as they think through problems and issues in our life and in the nursing discipline (Paul & Elder, 2008). Figure 3 below demonstrates the relationships between these concepts. Intellectual standards must be applied to the elements of thought. For example, in order to have a well-defined question and purpose, a student must apply clarity, accuracy, and precision to the statement. If the intellectual standards are applied to the elements of thought, the intellectual traits can be developed. For example, if precision and depth are applied to a student's assumptions and points of view, the student will be able to develop confidence in his/her reasoning, standing his/her ground when appropriate and changing positions if the evidence leads him/her to do so.

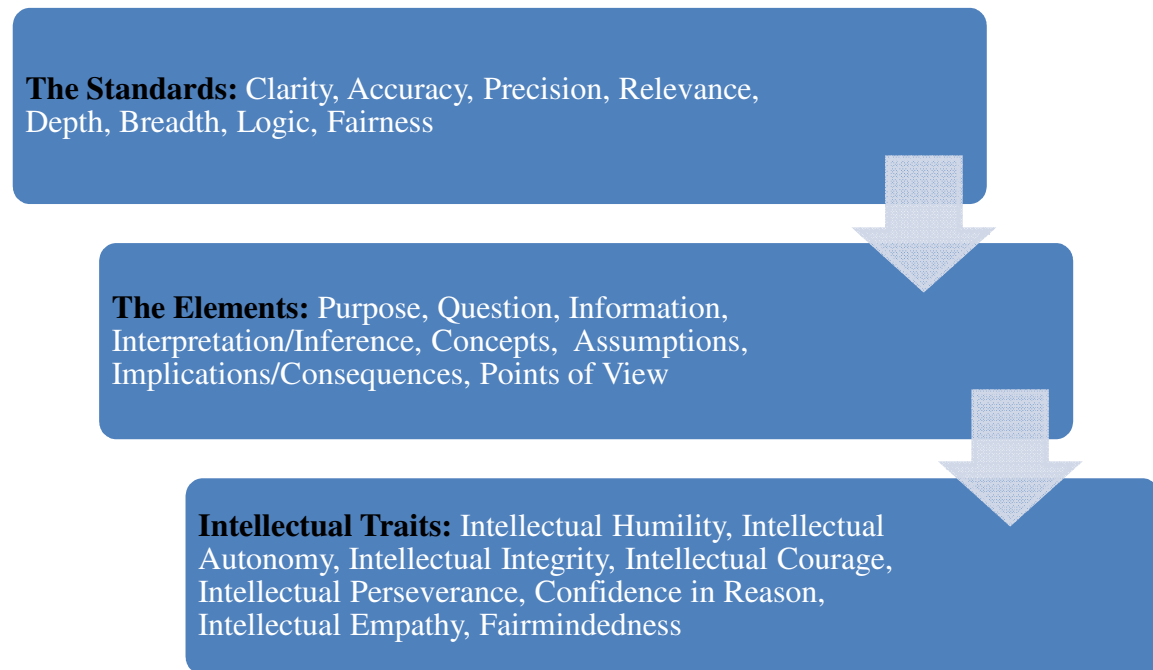


Figure 3: Paul's Model (recreated from www.criticalthinking.org)

Assumptions

For this study, the following assumptions were made:

1. Critical thinking is a necessary skill for nurses to possess to provide safe, competent care to patients in the clinical setting.
2. Participants will actively engage in the reflective writing intervention.
3. Experience working in direct patient care in a health care setting may increase critical thinking skills and/or disposition.
4. Critical thinking is acquired by reflecting in some way on previous experiences.

Limitations

Because data were collected at regional, state-supported, Southern universities, this sample may not be representative of the nation's BSN student population. In addition, the time frame for this intervention was eight weeks, which is a short time frame. There is no consensus

in the literature regarding the length of time that a student must experience an intervention for significant changes in critical thinking to occur. Finally, the intervention implemented was not implemented or tested prior to this study because this was a pilot study. The intervention was partially based on the NLN scenarios for Simulation in Nursing Education (2007) which were derived from the 2007 NCLEX-RN test plan (National Council on State Boards of Nursing [NCSBN], 2007). In addition, the reflective writing assignments were based on collected literature regarding triangulation, faculty feedback, and reflective writing. The assignments were also derived from Paul's model for critical thinking and include all concepts of Paul's model.

Delimitations

The intervention was implemented at two universities. Half of the participants from each university were assigned to the control group while half of the participants from each university were assigned to the experimental group. The experimental and control groups were not identical with regard to gender, race, age, or other characteristics, and the groups had different clinical and classroom experiences throughout the semester. Data were collected only in a baccalaureate nursing program in a junior-level course. This means the study is only generalizable to junior-level BSN students. In addition, the reflective writing assignments were not analyzed in this study.

Chapter II: Review of Literature

A great deal of literature exists about critical thinking and strategies for teaching critical thinking. A smaller amount of literature is available on writing and critical thinking, although writing is mentioned commonly as a teaching strategy to enhance critical thinking. Reflective writing is one writing strategy discussed in the literature, and some authors define reflective writing as the most important writing technique for improving critical thinking (Craft, 2005; Heinrich, 1992). In this literature review, I begin by describing the method I used to search professional literature along with the databases and keywords used. I discuss the organization of the literature into themes as they apply to Paul's model of critical thinking, which serves as the theoretical framework for this study. I examine, compare, contrast, and critique the available published literature that describes critical thinking, strategies for teaching critical thinking, and the relationship between critical thinking and writing. I also identify gaps in the literature and describe how this study addresses those gaps.

Method of Literature Search

I performed a literature search to find research studies that are relevant to this study. The electronic databases used include CINAHL, PubMed, PsycInfo, and ERIC. I used the following key terms in the literature search: nursing students, undergraduate, critical thinking, critical thinking disposition, writing, reflective writing, pedagogy, teaching strategies, intellectual traits (intellectual humility, intellectual autonomy, intellectual integrity, intellectual courage, intellectual perseverance, confidence in reason, intellectual empathy, and fair-mindedness), intellectual standards, elements of reasoning, and Paul's model. After reviewing the published literature, I found multiple articles that were appropriate for this literature review. The

publication dates range from 1989-2009. The older studies contained pertinent information about critical thinking and writing that are not outdated, some of which are classic studies.

After conducting the literature search, the selected studies were organized into themes. These studies were organized into four major themes found in Table 1 below.

Table 1

Identified Themes

Identified Themes	1. Comparisons Involving Critical Thinking Skills and/or Dispositions	
	2. Critical Thinking	Definitions
		Teaching Strategies
	3. Paul's Model and Writing	
	4. Writing Strategies for Teaching Critical Thinking	Writing Across the Curriculum
		Writing to Learn
		Reflective Writing

Prior Work

Comparisons Involving Critical Thinking Skills and/or Disposition

A study by Bartlett and Cox (2002) was conducted to determine the change in critical thinking disposition in physical therapy (PT) students over a year. They chose the second year of the program because it was more challenging and required greater demands to synthesize knowledge and clinical skills. The students completed the CCTST and CCTDI at the beginning and end of the second year. Students also provided demographic data at the time of the first assessment including gender, age, years of completed education, highest level of completed

education, and total number of hours spent volunteering in PT. None of the descriptive variables were associated with change on the CCTST or the CCTDI based upon multiple regression, but significant increases did occur in scores between beginning and end of the junior year. The greatest increase on the CCTST was in the deductive subscale ($p=0.001$), and the greatest increase on the CCTDI was in the truth-seeking ($p<0.001$) and self-confidence ($p<0.001$) subscales. There is no explanation, however, of why these increases occurred, although the authors mention that the junior year has a heavy clinical component. In nursing curricula, many courses have a clinical component. The reflective writing intervention that I implemented was in a course with a clinical component, which provided an experience upon which students could critically reflect. According to Paul, intellectual traits include intellectual autonomy, intellectual courage, and confidence in reason, and a clinical experience can provide students with opportunities to use these traits and later reflect upon them. In the study by Bartlett and Cox, no specific pedagogical strategies that may have helped to increase critical thinking skills or disposition were mentioned.

Published research also provides evidence that individuals in certain levels within nursing programs (such as junior or senior) have higher critical thinking and disposition scores according to the CCTST and the CCTDI than individuals in other levels (such as freshman or sophomore) (McCarthy et al., 1999), and students in specific degree levels in nursing education (such as BSN) have higher critical thinking scores than individuals in other degree tracks (such as ADN) (Shin et al., 2006).

The first example is from a non-experimental, comparative study by Shin and colleagues (2006). This study examined critical thinking skills and disposition scores in senior nursing students from ADN, RN-to-BSN, and BSN programs in South Korea to determine if the scores

were significantly different among programs. The convenience sample included 137 ADN students, 102 BSN students, and 66 RN-to-BSN students. Statistical significance of differences in scores was determined using ANOVA. The average CCTDI score for senior students in ADN, BSN, and RN-to-BSN programs fell short of the instrument's established mean score. The authors speculate that this may be due to the educational system in South Korea, which may discourage autonomous thought, or Paul's trait of intellectual autonomy. The comparison revealed that BSN students scored significantly higher than the other two groups on critical thinking skills and total critical thinking disposition as well as on the following CCTDI subscales: truth-seeking, self-confidence, maturity of judgment, and open-mindedness. The authors state that the significant differences are thought to be because of the variations in teaching methods. The BSN program may emphasize applying standards, such as clarity, breadth, and precision, to the critical thinking process, but the source of the difference between programs was not examined during this study.

Three studies from three different schools provided evidence that students' critical thinking skills and disposition scores increased from beginning to end of BSN programs. In McCarthy and colleagues' (1999) cross-sectional study, the CCTST and CCTDI were administered to two sophomore classes at the beginning of their nursing program and to two senior classes at the end of their nursing program. The groups were similar in age and gender. The sample included 156 sophomores and 85 seniors. Independent t-tests showed that seniors scored significantly higher on both the CCTST ($p < 0.001$) and CCTDI ($p < 0.001$) tests than sophomores. In addition, independent t-tests showed that seniors scored significantly higher than sophomores on the following CCTDI subscales: truth-seeking ($p < 0.05$), self-confidence ($p < 0.01$), analyticity ($p < 0.05$), and inquisitiveness ($p < 0.005$). This study did have the limitation

of being a cross-sectional design. The differences could have been a result of the differences in the two cohorts; however, the two groups did have some similarities. There was no report of any differences between the two sophomore classes or between the two senior classes. The researchers used both the CCTST and CCTDI because they believed that “critical thinking involves both cognitive skill and personality attributes” (p. 144), which is similar to Paul’s belief as demonstrated in his model. In my study, described in Chapter 3, I measured critical thinking by using both the CCTST and CCTDI because these instruments closely align with Paul’s model. I did, however, implement a specific intervention, based on Paul’s model, to determine if that intervention had an effect on critical thinking. This study did not seek to explain the reason for the differences in scores.

Thompson and Rebeschi (2000) take this comparison a step further by including age, grade point average (GPA), gender, and ethnicity. In their descriptive, longitudinal study, CCTST and CCTDI scores were obtained at program entry and two weeks prior to graduation. This baccalaureate nursing program was three years in length. The sample included thirty-eight students, and overall CCTST and CCTDI scores increased significantly ($p=0.006$ and $p=0.015$) from time of entry into the nursing program to time of exit. Scores were also significantly higher on the CCTDI’s truth-seeking ($p=0.002$) and analyticity ($p=0.009$) subscales at time of exit. A weak, significant correlation was found between ethnicity and CCTST exit scores ($p=0.04$), but there was no significant correlation between CCTDI exit scores and ethnicity. Also, no significant correlation was found between CCTST and CCTDI exit scores and age or GPA.

A strength of that study is that it was longitudinal and followed the same group of students throughout their nursing curriculum. However, the entry measurement was actually conducted after five nursing courses were completed, so this could have altered results. This

could have resulted in the insignificant correlations, and the significant correlations may have been stronger if entry measurements were taken prior to any nursing curriculum exposure. The authors speculated that learning experiences within the nursing curriculum may strengthen critical thinking skills and disposition. They mentioned that a debate format in class may increase openmindedness (or Paul's fair-mindedness), preparation for clinical learning experiences may increase inquisitiveness (or Paul's intellectual perseverance), and examining research findings and identifying implications for nursing practice may increase ability to infer. As a limitation, they say that this study cannot, however, establish a correlation between development of critical thinking skills and disposition and actual aspects of the nursing curriculum. The intent of my study was to determine the effect of a specific reflective writing intervention on critical thinking skills and disposition so that reflective writing could potentially be implemented in nursing curricula.

Another study (Giddens & Gloeckner, 2005) compared CCTST and CCTDI scores at program entry and exit and also examined the relationship between critical thinking disposition and NCLEX performance. A non-experimental, ex-post-facto approach was used, and 218 student records from one BSN program were examined. Independent t-tests were used to compare the entry CCTST and CCTDI scores of NCLEX pass (n=202) and fail (n=16) groups. On the entry CCTST, the pass group scored significantly higher than the fail group on the total score (p=0.015) and two subscales: analysis (p=0.017) and deductive reasoning (p=0.003). No significant differences existed on the entry CCTDI between pass and fail groups. The pass group had statistically significant higher scores than the fail group on the exit CCTST (p=0.003) and all five subscales. At exit, the pass group scored significantly higher than the fail group on CCTDI overall score (p=0.010), truth-seeking (p=0.007), open-mindedness (p=0.015), synthesis

($p=0.030$), and maturity ($p<0.001$). The only statistically significant difference between entry and exit CCTST scores was for deductive reasoning ($p=0.02$), and the only statistically significant difference between entry and exit CCTDI scores was for confidence ($p=0.001$). (Non-significant scores are not provided.) The small size of the fail group limited power and interpretation of results, and there was no mention of variability in scores, even though pass and fail groups were different sizes. The researchers said that the sample showed no “improvement in critical thinking skills during the course of the nursing program, despite an emphasis on critical thinking within the curriculum” (p. 89), yet there is no description of how critical thinking was emphasized. With my intervention, I attempted to demonstrate a specific method of emphasizing critical thinking using Paul’s model.

These results differ somewhat from the other two studies, as both the McCarthy et al. (1999) study and the Thompson and Rebesch (2000) study showed a significant increase in both CCTST and CCTDI overall scores from entry to exit. The sample used for that particular study included only 16 students in the fail group, which limits the interpretation of results. The study did, however, show that there is a significant difference on CCTST and CCTDI scores between students who pass and students who fail the NCLEX. This information is important to nursing program administrators because program livelihood is based on NCLEX pass rates, as mentioned in Chapter 1. State boards of nursing grant approval to nursing schools based on their NCLEX-RN pass rates (Kentucky Board of Nursing, 2010). Educators and administrators are also concerned about NCLEX-RN pass rates because there is a nursing shortage. If students are unable to pass the NCLEX-RN upon completion of the nursing program, they cannot enter the job market and help to reduce the shortage (Lengacher & Keller, 1990). In order to graduate students who are safe and competent practitioners, and to have better NCLEX-RN outcomes to

decrease the shortage and maintain operation of nursing schools, nursing school administrators and faculty desire to instill critical thinking skills into their students.

The five studies discussed above provide foundational information for nursing educators and administrators regarding critical thinking. One study provided evidence that BSN students scored significantly higher than ADN and RN-to-BSN students on critical thinking skills and critical thinking disposition. Two studies, one being a cross-sectional and the other a longitudinal study, showed evidence that critical thinking skills and disposition increased significantly from time of entry to time of exit, while a study at a different school provided evidence that scores did not increase significantly. Only one of the studies showing a significant increase speculated on specific curriculum requirements and their impact on the increase in scores. These requirements included aspects that were related to Paul's critical thinking concepts.

Results from the Giddens and Gloeckner (2005) study also provide evidence that critical thinking skills and disposition scores are higher in students who pass the NCLEX than those who are not successful. Bartlett and Cox's (2002) study provides information regarding an increase in CCTST and CCTDI scores from beginning to end of the junior level of a PT program, possibly due to the junior year having a large clinical component.

One final correlational study by Ingram (2008) looked at relationships among education, nursing experience in years, and critical thinking ability based on scores on the CCTST. Research questions were as follows: (1) What is the relationship between critical thinking ability and level of experience in registered nurses? (2) What is the relationship between critical thinking ability and the educational level of experienced registered nurses? One-thousand registered nurses from Nevada were randomly chosen from a master list of all registered nurses. The CCTST was mailed to these nurses, and a total of 165 nurses returned their tests. Of these,

many were excluded due to holding a Master's degree or having less than five years of experience. A total of 44 tests were scored, and the range of scores was 11-32 out of a maximum of 34 points. Spearman's rho correlations were performed for the total test scores and for each of the subscales. None of the Spearman's correlations were statistically significant for experience and critical thinking. As education increased (for example from ADN to BSN), evaluation and induction increased significantly ($p < 0.05$). No other correlations were statistically significant. Although this study did not show a statistically significant relationship between experience and critical thinking, this relationship will be examined as a covariate in my study. Prior to conducting my study, I hypothesized that there was a potential for healthcare experience to increase critical thinking scores. For example, nursing students who are working in a clinical setting while in nursing school may have more opportunities for demonstrating intellectual autonomy, intellectual integrity, intellectual courage, confidence in reason, and intellectual empathy.

Critical Thinking

Definitions, characteristics, and models. In the late 1980s, an attempt was made to universally define critical thinking. The project was coordinated by the APA to come to a consensus on the meaning of critical thinking and the characteristics of the critical thinker. The Delphi Method was used, involving an interactive panel of 46 experts who shared their critical thinking expertise and worked toward an ideal definition. Over two years, they participated in six rounds of questions identifying the core elements of critical thinking for the college student and shaping and reshaping the definition. Although no person may possess all of the characteristics included in their definition of critical thinking, the panel agreed that the definition should include all of the potential aspects of critical thinking. The definition and characteristics are as follows:

We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the...considerations upon which that judgment is based. Critical thinking is essential as a tool of inquiry...The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are precise. (Facione, 1990a, p. 2)

The ideal critical thinker is one who faces personal biases and a willingness to reconsider his or her ideas, and who is diligent in searching for information and focused in inquiry (Facione, 1990a). Other characteristics of the critical thinker mentioned in the Delphi Report are as follows: inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, focused in inquiry, and persistent in seeking precise results. This definition was constructed in the few years following Paul's statement defining critical thinking (Paul & Scriven, 1987). Paul was one of the experts included in the Delphi Report, and there are many similarities between these two definitions and the two descriptions of characteristics of a critical thinker.

As mentioned previously, critical thinking has been difficult to define. According to Kataoka-Yahiro and Saylor's (1994) Critical Thinking Model for Nursing Judgment, there are five components of critical thinking in nursing: specific knowledge, experience, competencies, attitudes for critical thinking, and standards. McCarthy and colleagues (1999) say that critical thinking is "related to and equated with reflective judgment, intelligence, logical thinking,

problem solving, nursing process, research, decision-making, diagnostic reasoning, therapeutic judgments, and the scientific method” (p. 142).

Brookfield, another well-known critical thinking researcher, says that critical thinking involves recognizing assumptions and biases that form a basis for thoughts and actions (Brookfield, 1997). His model of critical thinking includes five phases: (a) a trigger event, (b) appraisal, (c) exploration, (d) developing alternative perspectives, and (e) integrating into thinking and living. A trigger event is an unexpected happening that prompts discomfort. Appraisal is self-examination of the situation and finding others who are experiencing the same problem. Exploration is examining new ways to explain the experience. Developing alternative perspectives involves finding a new role and a new way of thinking about an experience. Then, the new ways of thinking can be integrated into living (Brookfield, 1987). Brookfield’s phases of critical thinking are very similar to Mezirow’s (1991) Transformational Learning theory, which includes the four components of experience, critical reflection, reflective discourse, and action.

Another critical thinking model that is similar to transformative learning is Ford and Profetto-McGrath’s model (1994). The three key concepts in this model are knowledge, critical reflection, and action. Ford and Profetto-McGrath explain that people must have knowledge to be able to think critically. People must also critically examine their practice, understand their situation, understand how they perceive the situation, and examine their assumptions. Finally, if people have knowledge and are able to critically reflect, then they can put their new ideas into action.

Paul’s Model of Critical Thinking, described in Chapter 1, is the most exhaustive model of critical thinking. Kataoka-Yahiro and Saylor’s (1994) model includes both cognitive and affective components to critical thinking, but specific dispositional traits are not described.

Brookfield's (1987) model details the process that people can go through to increase critical thinking, but the characteristics of the critical thinker are not described. Ford and Profetto-McGrath's (1994) model also identifies the steps in the critical thinking process, but individual characteristics are not mentioned. Paul describes the process, what standards must be applied to that process, and what traits a person must possess to be able to think critically. For this study, I implemented an intervention requesting that students write reflectively about clinical learning experiences. I hypothesized that the reflective writing assignments would increase the students' critical thinking disposition as well as their abilities to move through the critical thinking process while applying Paul's standards.

Teaching strategies. Aside from the fact that numerous definitions of critical thinking exist, there are numerous teaching strategies mentioned in the literature to help students become critical thinkers. For example, Reed and Kromrey (2001) say critical thinking models should be discussed in class and reiterated throughout the course. For the purpose of this study, teaching strategies for critical thinking were delimited specifically to reflective writing strategies.

Paul's Model

Broadbear and Keyser (2000) mention the utility of Paul's "very systematic and functional approach to teaching for critical thinking" (p. 323), including the elements of reasoning, intellectual standards, and intellectual traits. The authors discuss how the elements of reasoning apply to many health education issues, and the elements of reasoning offer a "framework for helping students reason about complex issues" (p. 323). More elements of reasoning would be applied to a situation by the students when a greater depth of thinking was required. Next, the authors discuss using the intellectual standards to assess elements of reasoning. This helps students to perform self-assessment in all areas of learning, and self-

assessment is not a process that comes naturally to most students. Finally, Paul's intellectual traits are described. These traits, according to the authors, are necessary for critical thought, and they "become inherent in a critical thinker" (p. 324). Additionally, these traits are particularly important in health education because the discipline concerns character development, sensitivity to needs of others, and appreciation of diversity.

Paul's Model for Critical Thinking has been mentioned in several studies where writing is integrated as a teaching strategy for critical thinking. Reed and Kromrey (2001) discuss their study, which used Paul's model for critical thinking to guide the teaching of a history course. The researcher taught students in the experimental group the model explicitly in class, trained students to use elements of reasoning to analyze historical documents and problems, gave out-of-class assignments requiring students to use the model for writing activities, provided handouts containing graphical displays of the model, and conducted discussions focusing on the elements of the model. The students were given three pretests, including the Ennis-Weir Critical Thinking Essay Test, the CCTDI, and the College Board Achievement Test in American History and Social Studies. They were given the same tests post-intervention, along with an Advanced Placement Examination for United States History. The experimental group scored significantly higher on the Advanced Placement Examination ($p=0.004$) and the Ennis-Weir ($p=0.0001$).

Holliway (2009) also used Paul's model, along with Writing Across the Curriculum (WAC) concepts (discussed later in this chapter) and the APA Delphi principles, to develop an educational psychology course. Some of the student goals, per the instructor, include the following: analyze, synthesize, and interpret the readings in your own words; use writing as a tool to explore, clarify, and reflect on issues from class; construct your own theory of learning, development, teaching, and education; and write creatively and confidently about the dimensions

of learning theory, development, and education. The class was held once a week, and agenda items included clarification of assignments, review of “big ideas” from previous weeks, video discussion, in-class writing exercises, and discussion of the following week. Several other writing assignments were incorporated into the class, such as an active learning summary, a reflection on personal productivity, a learning autobiography, and a cross-disciplinary writing assignment. The instructor documented each assignment, which goals were targeted, and the method of evaluation used for each assignment. Some assignments were evaluated using rubrics, while some were either given a + or – as a grade. The instructor collected anecdotal reflections from the students regarding each written assignment and included excerpts from each assignment. All student comments were positive, including some that described a new interest in and ease in learning.

Intellectual humility. In a literature review by Ratcliff (1994), he describes indicators of effective student learning in English composition. Writing, he says, has several proposed affective outcomes including the following: motivation, confidence, risk-taking, ability to accept criticism, sensitivity to audience, sensitivity to context, and intellectual humility. Intellectual humility is described as recognizing that other points of view on a subject may be legitimate. Students should be able to acknowledge the limitations of their points of view and examine evidence that contradicts their own ideas.

Intellectual autonomy. In their discussion of college students, De Stasio, Ansfield, Cohen, and Spurgin (2009) argue that students need greater intellectual autonomy. College students, they say, are overly dependent on parents. They report that parents help students with lab reports and editing papers, yet the most successful students are self-regulating and responsible for their own behavior. According to the authors, college curricula need to be designed to move students

towards intellectual autonomy, including individualized learning where students play a significant role in, and have the ultimate responsibility for, their learning. Some examples include research opportunities at the introductory level, interdisciplinary meetings about works students have read, immersion weekends for cultural experiences, and peer editing.

Intellectual integrity. Stephens (2004) states that intellectual integrity is a quality that both students and educators must demonstrate. According to him, intellectual integrity consists of treating peers appropriately and respectfully, approaching topics objectively, and being considerate of other viewpoints. Educators must demonstrate intellectual integrity as role models for their students.

Intellectual courage. The term intellectual courage is used occasionally in educational literature, but rarely is the term defined. Albrecht (2001) discusses intellectual courage in his article about the Information Age. He says that in order to be successful in any discipline, people must be able to trust their own wisdom instead of “following the herd” (p. 30). They also must be able to determine and follow the truth even when the truth is not the popular choice. He labels intellectual courage as a valuable survival skill.

Intellectual perseverance. The term intellectual perseverance is only used in writings by or referring to Paul. This term is not widely used to describe a trait of the critical thinker.

Confidence in reason. Although the term confidence in reason is not used in the literature, some techniques are mentioned that could help students to increase their critical thinking ability and their confidence in their ability to achieve success. For example, Anderson (2009) mentions using the National Assessment Program in Literacy and Numeracy (NAPLAN) review items to prepare students for literature and mathematics comprehension. The review items allow students to practice critical thinking, reasoning, modeling, and number sense. This technique, for

example, helps students to increase their ability to think critically and their confidence in their ability to perform well at literature and math.

Intellectual empathy. In Dearing and Steadman's (2009) article about enhancing intellectual empathy, they describe the development of therapeutic relationship between nurses and patients as one of the most important clinical competencies. Nurses must be able to relate to patients and understand their thoughts. Particularly with patients in mental health, intellectual empathy can help nurses to decrease personal bias and stereotyping and help to improve the therapeutic relationship with the patient. To possess intellectual empathy requires an individual to "redirect difficult feelings and situations experienced in the clinical setting in an encouraging and helpful manner" (p. 174).

Fairmindedness. In a report published by the Royal College of Psychiatrists and the College of Emergency Medicine, healthcare commissioners are urged to ensure that "the same standard of urgent assessment, diagnosis, and intervention is provided for mental health care as is expected for physical health care" (Lipley, 2009, p. 5). If patients who come to the Emergency Department for mental health concerns are treated equally to those who are seen for physical health care, this would be considered a fair-minded approach to healthcare. According to the author, treating patients with equality and not allowing biases to cloud judgment will produce better outcomes for mental health patients.

Writing Strategies for Teaching Critical Thinking

Writing Across the Curriculum. When searching the literature for pedagogical strategies that might increase critical thinking disposition, writing was a strategy that appeared in numerous research studies, not only in nursing, but in a variety of disciplines. One major reason for the prominence of this strategy is the Writing Across the Curriculum (WAC) concept that is

currently being emphasized in many university settings. This pedagogical movement surfaced in the 1980s as a result of college students' literary deficiency, and the principles of WAC include the following: writing is the responsibility of the entire academic community, writing must cross departmental boundaries to promote writing skills, writing must be integrated into all years of undergraduate education, writing promotes learning, and practicing writing in a discipline is the only way students can communicate well in their disciplines (Luthy, Peterson, Lassetter, & Callister, 2009).

Various strategies were mentioned in the literature for implementing WAC in university courses. Luthy et al. (2009) discussed techniques for teaching writing skills. At Brigham Young University (BYU), faculty members at the College of Nursing (CON) incorporated WAC. As part of the WAC process, the CON held a one-week faculty seminar to increase faculty confidence in the WAC principles. The CON also implemented the Writing Fellow Program, which used undergraduate students who were above average writers to consult and advise individual nursing students on their writing assignments. According to the recommendations of Lashley and Wittstadt (1993), faculty members reduced assignments into "smaller, more manageable assignments that sequentially build on one another."

McCabe (1994), from the discipline of political science, has years of experience integrating writing assignments into his beginning-, middle-, and upper-level courses. Because of the tenets of WAC, he assigned beginning level students a choice of topics for which they had to read pros and cons and then argue either side. They also were given handouts of general suggestions about writing, and they were allowed to bring drafts to class for peers to review. In upper-level courses, students were asked to prepare three-page analyses about each of the seven broad class topics and eventually prepare final drafts on five of the topics. In almost every case,

the “initial student reaction was one of unhappiness...at what they perceived to be additional requirements, and requirements they argued had little to do with political science” (p. 11). As the semester progressed, students said they “genuinely benefitted from the insights of other members of the group” (p. 11). The papers showed evidence that students realized there are two sides to every argument, and the strength of the argument depends on the evidence they used to support it. McCabe said that writing is “a vehicle for integrating university curricula, which are likewise typically viewed by students as simply a series of courses, having little to do with each other” (p. 12). He also mentioned that he emphasizes clarity, one of Paul’s concepts, in both his assignments and in the student responses.

Writing Across the Curriculum emphasizes the importance of including writing in all college courses. Being able to write effectively in an English course will not suffice; students must learn how to write in their respective disciplines and how to express themselves using written communication over a variety of topics (Luthy et al., 2009). Not only will this help students to be competitive in the job market upon graduation (Luthy et al., Thorpe & Kulig, 1997), but also helps them learn valuable course content (Allen, Bowers, & Diekelman, 1989).

Writing to Learn. The Writing to Learn (WTL) paradigm is at the core of writing and is receiving a great deal of attention in university settings, particularly in programs of nursing (Allen et al., 1989; Emig, 1977). The WTL paradigm states that writing is a process through which content is learned and understood, writing skills are critical thinking skills, writing involves developing an understanding, and writing helps to produce higher order conceptual skills. In addition to these principles, the WTL paradigm incorporates the idea that thoughtful faculty feedback is crucial and the instructor is an active participant in learning. For this reason, during my intervention, I provided thoughtful feedback to participants regarding each reflective

writing exercise. The WAC concept is based on this paradigm, evidenced by the fact that one of the main principles of the WAC concept is that writing promotes learning (Luthy et al., 2009).

The idea of WTL is visible in many published research articles. For example, Bowers and McCarthy (1993) discuss a health issues course where changes have been made in course content to reflect the WTL strategies. Before implementing WTL strategies, students read one textbook and wrote one 10-20 page term paper due at the end of the course. Mid-term and final exams were based on students' ability to recall information. After implementation of the WTL strategies, course readings from various sources were assigned based on clarity and appropriateness to specific topics. Four short, focused writing assignments were assigned during the semester, and these assignments were designed to encourage students to integrate, prioritize, prove, contextualize, etc. Students attended workshops at the university's writing lab to help them understand the assignments, and they were allowed to rewrite assignments if desired. Exams were also rewritten to shift from retaining content to truly understanding it. The questions asked students to integrate information instead of just recall it. As a result of these changes, faculty reported increased satisfaction among students. Students felt they were developing a closer relationship with their instructors due to the increased and detailed feedback. Faculty reported the new assignments made it easier to identify students who were struggling early in the semester. Overall, the feedback regarding these changes was positive; however, faculty reported a large increase in workload due to the interactive nature of the assignments.

Drabick, Weisberg, Paul, and Bubier (2007) also use a form of short writing assignments. In their study, the researchers randomly assigned psychology course sections to either writing or thinking conditions. A total of 978 undergraduate students participated in this study, 512 of whom were assigned to the writing sections where they completed "minute papers"

in class. Minute papers involve students writing for several minutes in class in response to a question, usually regarding what the student did not understand or what the student found valuable in any given lecture. In these particular writing sections, questions focused on opinions about controversial psychology issues and applying course content to everyday life. In the writing sections, students were asked to write for five minutes about the topic. In the thinking sections, students were asked to think for five minutes about the topic. Following the writing or thinking, students discussed the topic as a class for 10 minutes. After every three writing or thinking assignments, students took a multiple-choice exam. Students in the writing sections performed significantly better on both factual ($p=0.006$) and conceptual questions ($p=0.02$) on the exams than students in the thinking sections. A limitation to this study is that it is not clear if the students in the thinking group used their five minutes to actively think about the topic. In my study, I did not specifically have a writing group and a thinking group. Instead, I had a group of students who completed the reflective writing assignments and a group of students who participated in typical class and clinical activities. Also, the sections, not the individual participants, were randomly assigned to conditions in the study by Drabick and colleagues. In my study, individual participants were randomly assigned to the control and the experimental groups.

Wade (1995) agrees that writing has advantages over oral expression. According to Wade, written assignments ensure that all students are participating, which is required for active learning. Further, written assignments can be formatted to allow students to rewrite and reconstruct as needed. Wade also agrees with the concept of short, focused writing assignments. In her courses, she assigns questions for each major topic in the course. Then she allows students to select any six assignments to complete during the semester. Although they are not graded, the

instructor makes detailed comments on all assignments, emphasizing the importance of faculty feedback on all writing assignments. In my study, I assigned short, focused reflective writing assignments, and I provided feedback on all assignments.

Short, focused writing assignments, or microthemes, are also being used to help students critically think (Allen et al., 1989). Allen and colleagues advise faculty members to encourage students to keep a portfolio of all writing examples throughout the curriculum. The portfolio would illustrate students' "growing competence in both writing and thinking skills" (p. 9). After participants completed my intervention, they were allowed to use their writing assignments in a writing portfolio that is required for graduation.

Other research articles describe the use of the writing portfolio as a method of critical thinking assessment and a method of promoting critical thinking skills. Sorrell, Brown, Silva, and Kohlenberg (1997) discuss a collaborative research project between nursing and English conducted to determine if writing portfolios can be used to assess critical thinking skills in nursing students. Two nursing professors collaborated with an English professor at two different universities to assess writing portfolios. Four students per university, who were chosen by as "good but not necessarily outstanding" (p. 3) writers, were selected by their faculty members to participate. No further detail was provided about why these students were labeled as good but not outstanding. The students were asked to select four pieces of writing that reflected critical thinking skills from any classroom or clinical assignments in nursing. The professors then evaluated the portfolios based on the Critical Thinking Skills Evaluation Instrument, which includes elements such as inductive reasoning, deductive reasoning, ability to draw logical inferences, and ability to analyze and interpret. In the article, specific examples were given from the writing samples that demonstrated each of the instrument's items. Findings from that study

suggest that students have a different view of how their writing related to critical thinking than faculty members. Students selected research papers rather than journal entries for their portfolios, indicating that students believe critical thinking is equivalent to scholarliness. It is important that students are able to differentiate between the two, and one potential strategy to help with this is the explicit teaching of Paul's critical thinking model (Reed & Kromrey, 2001). Findings also suggest that portfolios can help with critical thinking assessment and with promoting critical thinking. Finally, they concluded the lack of evidence of critical thinking in the portfolios might reflect the faculty members' emphasis on correct answers and formats. If my intervention showed an effect on critical thinking, faculty members could use this method to increase critical thinking, with less emphasis on correct answers and formats.

Two articles mentioned the use of freewrites when implementing WTL strategies. The first, by Schmidt (2004), describes the use of writing to learn activities (including freewrites, mini-essays, letters, and brainstorming) in nursing courses to decrease writing anxiety. The second article (Baird, Zelin, & Ruggle, 1998) is from accounting. Baird and colleagues mention that writing assignments in accounting are thought of as valuable by many faculty members because they help to develop students' written communication skills. But the authors point out that writing assignments promote critical thinking and learning, a premise held by the WTL paradigm. This study was performed at a university in three accounting courses, and there were both treatment and control groups. The treatment or writing group completed one freewrite assignment during each class period, resulting in 14 freewrites in each of the treatment groups. The freewrite involved answering a question or reacting to a statement about the day's topic. Grades were awarded for participation only. Students in the treatment groups performed better on average on seven out of nine exams, which consisted of multiple-choice, essay, and case

study questions, and the writing group had a higher minimum score on all exams. Overall, students reacted favorably to this intervention and believed it to be beneficial to their learning. There is no clear explanation, however, as to why students in the treatment group did not score better on the other two exams. Also, there is no mention in the article of an increase in test scores indicating an increase in critical thinking skills or disposition.

The WTL paradigm assumes that writing is learning and that writing can help to develop critical thinking (Allen et al., 1989). Several strategies incorporating the WTL paradigm are mentioned, including short in-class writing assignments (Allen et al.; Bowers & McCarthy, 1993; Drabick et al., 2007; Wade, 1995); portfolios (Allen et al.; Sorrell et al., 1997); and freewrites (Baird et al., 1998; Schmidt, 2004). My intervention incorporated principles of the WTL paradigm in that the writing intervention was intended to increase critical thinking. Participants completed short, focused writing assignments, and most included their writing assignments in a writing portfolio.

Reflective writing. Reflective writing is another method that is frequently mentioned when discussing WAC and WTL strategies (Allen et al., 1989; Wade, 1995). Several authors specifically identify reflective writing as the recommended writing strategy for promoting critical thinking among students. Craft (2005) discusses how reflective writing, specifically journaling, is useful in developing critical thinking skills. She mentions that reflective writing helps to develop writing and reading skills and can also reduce stress levels. Further, reflective writing can be used for students to reflect on as they progress through their nursing programs and nursing careers. For nurses to benefit from reflective writing, the process of reflection needs to be integrated in nursing education curriculum. In order to implement reflective writing, she suggests the following: faculty support and training in the use and evaluation of journal writing,

initial guidance for students about what to write and when to write, inclusion of clinical experiences and analyses, grades based on pass/fail, and an interactive approach to reading journals with only one faculty member providing feedback. For my intervention, I trained and supported the participants in their reflective writing, I guided students on what to write and when, they included reflections on clinical experiences, and only one person provided feedback for the assignments.

Journal writing improves reading and writing skills, deepens reflection ability, increases students' ability to link classroom and clinical experiences, and "facilitates analysis and synthesis" (Heinrich, 1992, p. 17). Journals are a dialogue between the student and the teacher, and they can be used as an assessment tool for writing skills and linkage of didactic and clinical experiences. Her article contains information about a triangulation model for dialogue journal writing assignments in nursing courses. The triangulation model of journaling helps students connect personal and professional experiences, reading and theory, and classroom discussions. Heinrich recommends the journal assignments be "ritualistic and...creative" (p. 18). Students should be ritualistic by setting time every day for reflective writing, and they should be creative in expressing themselves in the writing and in the journals, such as with colors, pictures, or poems. Before assigning the journals, Heinrich typically allows students to freewrite to become less anxious about the writing process. She also suggests reviewing journal entries every other week, giving appropriate and meaningful feedback, and allowing students to determine how much the journaling assignments should count towards their final grade. The major drawback to dialogue journals is the time required to provide the feedback, but Heinrich recommends allowing students to give feedback to other students when classes are large. Because I provided feedback to students after each writing assignment, the reflective writing exercises were a short

dialogue between educator and student. Participants were encouraged during my intervention to use the triangulation model, connecting experiences with classroom and reading material. For example, in two of the reflective writing assignments, participants were asked to determine what classroom concepts influenced the caregiving activities they performed. While creativity was not discouraged in the intervention, the focus of the intervention was to integrate the concepts of Paul's model. For example, participants were asked to express ideas through writing with clarity, accuracy, precision, and depth.

Recommendations are given by Baker (1996) for components of reflective journaling. He suggests that students include the following four components in journal entries: identification, description, significance, and implications. In the BSN course he describes, students write about clinical experiences, including activities, conversations, events, and feelings. He also recommends students be creative in their reflective journals, including pictures or drawings if desired. As mentioned previously, creativity was not discouraged in my intervention, but the focus was integration of Paul's model. There is overlap between Baker's suggestions and Paul's concepts. Baker suggests identification of an issue in the journal entry, while Paul says that the critical thinker identifies a purpose and a question. Baker recommends description in a journal entry, while Paul proposes interpretation. Baker advises students to identify significance and implications, and Paul suggests identification of implications and consequences.

Reflective writing assignments help to encourage critical thinking, understanding, insight, and clinical judgment (Rooda & Nardi, 1999). In a two-year study, 21 faculty members who taught in a BSN and ADN program at a college of nursing completed a questionnaire and were interviewed about the writing assignments included in their courses. The questionnaire included questions about how many writing assignments were used in courses, the purpose of the

assignments in the courses, and what role the assignments played in teaching and learning. In the interview, faculty members were asked what writing assignments would be developed and used for their courses if the faculty members had unlimited resources and time. Results of the questionnaire showed that in the ADN program, students completed 13 to 14 writing assignments each semester of their first year, while BSN students completed 15 to 20 assignments each semester of their junior year and 24 to 31 assignments each semester of their senior year. Included in the writing assignments were care plans, journals, research papers, assessment, and case studies. There were many redundant assignments identified, and most did not require critical thinking. The faculty decided to substitute written nursing care plans with reflective assignments about problem-solving processes in clinical courses. They also began to work willingly on collaborating on written assignments that used critical thinking skills. According to the authors, students began to use the writing assignments to synthesize content, and faculty reported that students began to more actively use critical thinking in the clinical setting.

The sample size in this study was small, and it was a self-study as opposed to empirical research. However, the study provided important insight into writing collaboration among faculty and its effect on students' critical thinking abilities. This study introduces the idea that writing exercises that emphasize critical thinking skills can increase students' critical thinking abilities in a clinical setting. My reflective writing intervention, which incorporated Paul's critical thinking concepts, was expected to increase students' critical thinking skills and disposition, and students would be able to demonstrate those skills in the clinical setting.

Reflective writing to improve critical thinking is discussed by McGuire and colleagues (2009). In that study, reflection papers were defined as "reflective writing assignment(s) that [are] focused upon a specific activity (a reading or group of readings, video, service learning,

practicum, role play, guest speaker, group activity, etc.) that highlights the student's learning from that activity" (pp. 96-97). In the study, social work students completed a course where instructors had assigned multiple reflection papers. Seven themes were identified that described how students felt about the utility of reflection papers: active participation, dialogue with instructor, critical thinking, connecting theory to practice, values clarification, improving written communication skills, and concerns with grading. Most students agreed that the reflective writing assignments gave them a way of participating in class, and they believed the exercises helped them to define their values and become more aware of personal biases. The students, overall, felt the exercises were helpful when the instructor gave feedback, and they believed the assignments forced them to think critically and elaborate on concepts. The researchers concluded that for a reflective writing assignment to increase critical thinking, it must be structured to facilitate integration of experience and didactic material, it must be graded by a rubric, and it must foster dialogue between student and faculty member. According to the authors, reflective writing as a pedagogical strategy allows students to integrate their thoughts and experiences with didactic material in order to more adequately understand both the experiences and the didactic material. Although the reflective writing assignments that I used in my intervention were not evaluated in this study, the assignments facilitated integration of experience and didactic material, and there was a short dialogue between student and researcher.

The five articles above describe methods of implementing reflective writing exercises in the classroom to develop students' critical thinking abilities. Craft (2005), Heinrich (1992), and Baker (1996) focus on journaling specifically. Craft mentions how journaling can actually help to improve writing skills and be used therapeutically to decrease students' stress levels, particularly after involvement in stressful clinical situations. Heinrich describes the dialogue

journal, focusing on faculty feedback and the strategy of triangulation, which includes reflection on experience, reading, and didactic elements. Baker focuses on the components of the reflective journal assignments, including identification, description, significance, and implications. Rooda and Nardi (1999) and McGuire et al. (2009) suggest slightly different reflective writing exercises. Rooda and Nardi focus on substituting reflective writing about clinical problem-solving for existing writing assignments while McGuire and colleagues describe writing about previous learning experiences, including clinical learning experiences, videos, and guest speakers. Therefore, both McGuire et al. and Heinrich emphasize the importance of synthesis of personal experience and classroom activities in the writing exercises. All of the above authors mentioned that a major component of reflective writing is the feedback from instructors and the development of the teacher-student relationship. Although I am not the teacher for the students that participated in my study, the students received feedback from me and developed an educator-student relationship through writing and dialogue.

Kennison (2006) states that “critical thinking and reflection are inextricably linked in nursing practice” (p. 269). She believes that reflecting on clinical experiences through writing helps to develop a sense of self-awareness that leads to improved practice. In a study to establish interrater reliability of the Critical Thinking Scale (CTS), Kennison assigned graduating BSN students a reflective writing exercise. Over three years, her sample size was 57. The exercise involved students completing written reflection of what had occurred and their thoughts and feelings during a clinical experience. Students also completed the CCTST exit exam. Three critical thinking experts used the CTS to evaluate the reflective writing exercises for evidence of critical thinking. Interrater reliability was calculated using the Pearson product-moment correlation and was found to be statistically significant ($p < 0.01$). For example, interrater

reliability was calculated between raters one and two, between raters one and three, and between raters two and three. The interrater reliability of .702 between raters one and three was the highest agreement and explains 49.2 percent of the variance. A statistically significant relationship ($p < 0.05$) was also found between CCTST scores and the mean teacher ratings of students' reflective writings. The sample was a convenience sample from one institution, which is a limitation of this study, but Kennison states that because it is valuable for students to write reflectively, the CTS will provide "fair and consistent evaluation" (p. 272).

Several authors have mentioned the major struggle for instructors with the reflective writing assignments, and any writing assignments for that matter, is the time involved in providing effective feedback for students (Drabick et al., 2007; Heinrich, 1992; Wade, 1995). Although many rubrics exist for evaluating students' written assignments, the CTS could potentially be a tool for specifically evaluating critical thinking in reflective writing exercises, which would be a less time-consuming method of evaluation. In my study, I did not evaluate the participants' written assignments. However, if my plan was to evaluate the assignments, I would minimize the workload and decrease subjectivity by using a rubric or tool such as the CTS.

Summary and Gaps in Knowledge

Several studies have compared CCTST and CCTDI scores between samples. One study proposed data that BSN students have higher scores on the CCTST and CCTDI than ADN and RN-to-BSN students. Two studies supplied evidence that CCTST and CCTDI scores increase during a nursing program, but another offered evidence that these scores do not increase significantly. One study provided evidence that experience does not increase critical thinking skills and education only produces minimal increases (Ingram, 2008). And Giddens and Gloeckner (2005) concluded that CCTST and CCTDI scores are higher in students who pass the

NCLEX than those who fail. In a literature review by Adams (1999), she states that there is no conclusive evidence that nursing education increases critical thinking skills.

Overall, there is very little explanation of why differences do or do not exist between the samples and what strategies can be used by nursing faculty to effect changes in critical thinking skills and disposition. A study from physical therapy provides evidence that critical thinking skills and disposition scores increase significantly from beginning to end of one clinical-heavy year, but there is little evidence to support the clinical component as the cause of the increase. Further research is needed to determine the relationship between program type, program level, NCLEX success, and/or pedagogical strategies and critical thinking skills and disposition (Brooks & Shepherd, 1990; McCarthy et al., 1999). Although my study did not compare program types or levels or NCLEX success, it did provide information to nursing faculty and administration by testing one pedagogical strategy's ability to affect critical thinking skills and disposition. From the findings in this study, faculty members gained knowledge about implementation of a pedagogical strategy and its effect on critical thinking skills.

There is evidence that Paul's model can be used as a framework to teach critical thinking (Broadbear & Keyser, 2000), and there is further evidence that Paul's model can be used in combination with writing to increase critical thinking skills (Reed & Kromrey, 2001). There is no mention in the literature, however, of incorporating Paul's model into a specific writing intervention to increase critical thinking skills and/or disposition.

The information available about WAC and WTL offers a perspective on why writing in the nursing curriculum is so important. Students need to write in their respective disciplines to obtain jobs upon graduation, as writing is considered a "threshold skill" for hiring and promoting (College Board, 2004). And by examining the WTL paradigm's assumption that writing is

learning and writing helps to produce critical thinking, nursing faculty members and administrators identify a need for implementing writing assignments in nursing curricula. Short, in-class writing assignments, portfolios, and freewrites are examples given in the literature that can be used to implement writing in nursing curricula. Increased student support and improved faculty-student relationships have been reported after implementing these strategies. There is, however, no empirical evidence that these strategies improve critical thinking skills or disposition.

Reflective writing is specifically mentioned as a pedagogical strategy that can increase critical thinking in college students (Craft, 2005; Heinrich, 1992; McGuire et al., 2009; Rooda & Nardi, 1999). Journaling is used, including the dialogue journal and the method of triangulation, and guidelines are given in one article for components of a reflective journal assignment. Reflective writing assignments can be substituted for existing writing assignments, and reflective writing can include reflection on experiences including clinical learning experiences and other classroom activities. The literature available regarding components of reflective writing assignments is limited, and most of what is available regarding the assignments is vague. Faculty members have reported the development of strategies to improve critical thinking is difficult (Kataoka-Yahiro & Saylor, 1994), so the current study provided information about the development of a strategy that may improve critical thinking skills and disposition.

Chapter III: Methods

In this chapter, I provide a description of the research design, sample, setting, recruitment techniques, participant consent, and method of measurement for this intervention study. The study was designed to test the effectiveness of a novel reflective writing intervention, based on Paul's model of critical thinking, for improving critical thinking skills and dispositions in baccalaureate degree nursing students over the period of an eight-week clinical rotation. I describe the instruments, the CCTST and CCTDI, that were administered to students pre- and post-intervention. I detail each of the subscales that are included on the CCTST and CCTDI and explain how they relate to Paul's model of critical thinking. This chapter also includes an explanation of the reliability and validity of the instruments. Finally, I provide a description of each portion of the reflective writing intervention, and I conclude the chapter with ethical considerations for this study.

Research Design

The large pilot study described here consisted of a reflective writing intervention which was administered to a group of baccalaureate nursing students. The design for this study was experimental, and more specifically, a level III pretest-posttest design. A level III study builds on previous research, and uses an experimental design to test variables. Also, a level III study specifies the direction of the variables in relation to one another (Wood & Ross-Kerr, 2011). For this study, this design was most appropriate because there was an experimental group, who completed the reflective writing intervention, composed of fourth-semester baccalaureate nursing students from two institutions. There was also a control group, which was composed of fourth-semester baccalaureate nursing students from the same two institutions. Both groups completed two instruments prior to the intervention and after the intervention, which indicates a pretest-

posttest design. The hypothesis states that the reflective writing intervention will increase critical thinking skills and disposition; therefore the direction of variables is specified.

These students were all enrolled in an adult health nursing course with a clinical component. The clinical rotations at both institutions included 12-hour clinical days on a medical-surgical unit with adults, and objectives consisted of the following concepts: utilization of the nursing process, demonstration of growth as a professional nurse, therapeutic communication with clients, and collaboration with team members. Based on the studies described in Chapter Two, enough literature exists to predict the relationship between the independent (reflective writing intervention) and dependent (scores on two critical thinking instruments) variables, and the plan was to test the significance of that relationship. Figure 4 below shows a diagram of the study.

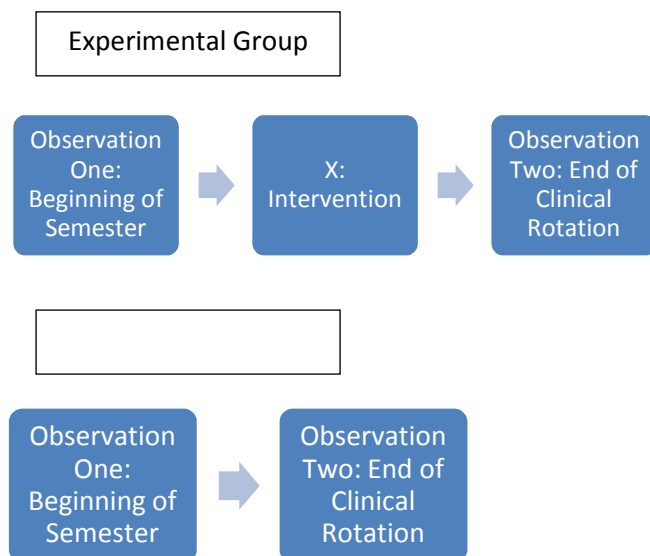


Figure 4: Diagram of Study

At the beginning of the semester, during the first week of the term, both control and experimental groups completed the CCTST and CCTDI. Then, the experimental group participated in the reflective writing intervention, consisting of six reflective writing assignments

described later in this chapter, throughout the clinical rotation. Both groups completed a post-intervention CCTST and CCTDI the week after completion of their eight-week clinical rotation.

Sample and Setting

Sample

The participants were enrolled in the fourth semester of a six semester baccalaureate nursing program. In this semester of the selected baccalaureate nursing programs, the didactic material is complex, tests require an in-depth synthesis of material, and clinical experiences consist of 8 to 12 hour shifts involving independent patient care. The opportunity for autonomous patient care and exposure to complex didactic material provided students with experiences upon which to reflect critically; therefore, data were collected in the fourth semester. The sample was a randomly assigned convenience sample of 70 baccalaureate nursing students in their fourth of six semesters of nursing school. All fourth-semester baccalaureate nursing students at the participating institutions who were involved in first-half semester medical-surgical clinical learning were invited to participate. At both institutions, students at this level are primarily female, with approximately 2-5% of the student body being male. The majority of students at this level are non-degree holding students between 20 and 22 years of age. All had completed their general education courses and were enrolled full-time in nursing courses that include clinical learning experiences.

Setting

The setting for this study included two universities in the South, with Carnegie designations of L4/R (Large, four year, primarily residential) and L4/NR (Large, four year, primarily non-residential). The sample was taken from the Health Maintenance and Restoration: Adult course at one institution and the Caring for Adults with Health Deviations I course at the

other institution. Both courses were offered in the fourth semester of the two undergraduate baccalaureate nursing programs, and these courses were considered the adult medical-surgical courses in the nursing curricula. The clinical experiences took place at local acute care facilities in clinical areas where the patients are acutely, but not critically, ill. Students at both institutions completed approximately twelve clinical days, most of which involve direct patient care. Some clinical days involved observations and in-house simulations and laboratory experiences.

Recruitment Strategy

There was a limit of 110 students who could register for this course at one institution and 85 at the other, and approximately half of these students were in first-half semester medical-surgical clinical learning experiences. During class time in the first week of their course, I provided information about the study to all fourth-semester nursing students who were involved in first-half semester medical-surgical clinical learning experiences at both institutions. Students were informed of the \$10 gift cards they would receive for participation. Once the students consented to participate, half of the students at each institution were randomly assigned to the control group and half to the experimental group.

Procedures

I organized a plan with the course instructors determining dates for an information session, the pre- and post-intervention CCTST and CCTDI, and dates for intervention implementation (Appendix A). During course orientation in the first week of classes in the spring semester, I visited the nursing courses at each institution to explain the study, invite participants, and obtain consent. On the day that I visited the classes, I excused all students who were in second-half semester clinical experiences, explained the study, and included a description of reflective writing and the writing assignments. The writing assignments were not included as an

assignment for evaluation in the actual nursing course, and initially, only participants who were selected for the experimental group of the study were asked to complete the writing assignments. I reviewed the risks and benefits with the potential participants and informed them that each of the six assignments would take at least 20 minutes to complete and should consist of at least 300 words (one double-spaced typed page). I explained to students that a \$10 gift card incentive would be offered for participation. Finally, I reviewed the consent form and answered all questions from students.

Once this was completed, I invited all students in first-half semester clinical learning experiences to participate in the study (Appendix B). All who did not want to participate were excused from the classroom, and all who chose to participate were given informed consent forms. I reviewed the consent forms with all participants. After participants signed consent forms, I informed the participants of the time and place for the pre-intervention CCTST and CCTDI tests, which were administered in a quiet classroom in the nursing building the following day after class. Demographic information forms were also completed at this time, and these included questions about age, race, gender, and months of health care experience, excluding clinical learning experiences (See Appendix C). For this study, the variable months of health care experience was examined, and the other demographic data were collected for potential use in this and later studies, as identified in the IRB Form and Informed Consent (Appendix D). In addition, writing assignments were kept for potential use in later studies, as had been approved by the Human Subjects Review Board and Informed Consent.

I randomly selected half the participating students at each institution as the control group and half as the experimental group by using a computerized, true random number generator (www.random.org). I assigned each participant a number from a random numbers table for both

the pre- and post-intervention CCTST and CCTDI form. A master list of all names and numbers was entered on a password-protected file on my laptop computer. This computer remained in my possession at all times.

On the predetermined day, the pre-intervention CCTST and CCTDI were administered at each institution in a quiet, comfortable classroom setting. I provided participants with instructions for the tests (Appendix E) and told them they needed to return both the tests and answer sheets to me upon completion. I distributed the CCTST and CCTDI to all participants. Participants returned their CCTST and CCTDI after completion to the front of the room, and the randomly assigned number was written on each participant's answer sheet by the researcher. After all participants completed both tests, I mailed the answer sheets, with only the randomly assigned number for identification, to Insight Assessment, the company that distributes and initially analyzes the instruments. Within five days, Insight Assessment emailed a spreadsheet of scores to me. This file was saved on my computer and protected with a password. This file was also stored on an external hard drive that was in my possession at all times. All instruments and answer sheets were kept in a locked file cabinet in my office, located at the Murray State University School of Nursing, Room 219, until the study was completed, at which time I transferred them to my dissertation chair's office, located at the University of Tennessee Knoxville, College of Nursing, Room 239.

At one institution, the dissertation chair administered the pre-intervention CCTST and CCTDI, due to students' schedules. I provided the dissertation chair with specific, step-by-step instructions for administration (Appendix E). At the other institution, I administered all of the pre-intervention tests except to six students who were unavailable when I was on campus. For this situation, a proctor handed out and collected pre-intervention tests to the six students and

enabled a speakerphone for me to provide all instructions for the students. An IRB Form D was completed due to these changes (Appendix F), and all necessary reports are filed.

On the predetermined day, the post-intervention CCTST and CCTDI were administered in the same classrooms as the pre-intervention tests, and the same protocol was followed. I administered posttests to both groups of students.

Measures

Critical Thinking

To measure critical thinking, Facione's CCTST (1990c) and CCTDI (1994) were administered to junior-level baccalaureate nursing students at the beginning and end of their nursing clinical rotation.

CCTST. The CCTST is a standardized test specifically designed for college-aged students that contains 34 multiple-choice items. The theoretical construct for the CCTST is the "consensus conceptualization of critical thinking reached by a panel of 46 experts participating in a Delphi research project" (Facione, 1990b). As mentioned previously, Paul was a member of the panel, and much of his prior work was incorporated into the consensus conceptualization. There is considerable overlap between the concepts included in Paul's model of critical thinking and the CCTST, despite differing terminology (Reed, 1998). Table 2 below lists CCTST subscales and definitions on the left and Paul's related concepts on the right.

Table 2

Comparison of CCTST and Paul's Concepts

CCTST Subscales	Paul's Concepts
Interpretation: comprehension and expression of the meaning of a “wide variety of experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria” (Facione, 1990b, p. 5)	Elements of Reasoning *identification of the purpose of the thinking *inference, interpretation, and solution
Analysis: identification of the intended and actual “relationships among questions, concepts, descriptions, or other forms of representation intended to express beliefs [and] judgments” (Facione, 1990b, p.5)	Elements of Reasoning *determining the problem or question at issue *gathering data *identifying concepts or theories *recognizing assumptions *defining points of view
Evaluation: assessing the credibility of statements and the strength of relationships among statements (Facione, 1990b)	Elements of Reasoning *determining consequences Intellectual Traits *fair-mindedness
Explanation: stating the results of and justifying reasoning as well as presenting that reasoning in a cogent argument (Facione, 1990b)	Intellectual Standards *clarity *depth *accuracy *breadth *precision *logic *relevance *fairness Intellectual Traits *confidence in reason
Inference: identification and securing of elements needed to draw conclusions, forming hypotheses, and considering relevant information (Facione, 1990b)	Elements of Reasoning *inference Intellectual Standards *relevance

The CCTST targets the five cognitive skills mentioned previously: interpretation, analysis, evaluation, explanation, and inference. For critical thinking skills assessment, there is one answer that is designated as the superior choice. The distracters were selected by panelists during the Delphi research. Using Delphi research information, the first nine questions relate to

the core critical thinking skills of interpretation and analysis. Items 10-13 and 25-34 relate to evaluation and explanation. Items 14-24 related to the critical thinking skill of inference (Facione, 1990c).

Recommended percentile rankings for raw scores were developed based on the analyses of 1673 tests completed by representative samples of college students from 1989-1990 at a state university. A student who answers 20 questions correctly on the pretest would rank in the 86th percentile. The same score on the posttest would rank in the 75th percentile (Facione, 1990c). Facione (1990b) conducted experiments to determine if the CCTST measured growth in critical thinking skills. For example, one experiment compared pretest and posttest means of two groups of students who were enrolled in four different campus-approved critical thinking courses. The CCTST showed statistically significant growth in critical thinking skills from beginning to end.

Facione and colleagues reported an internal consistency for the CCTST ranging from 0.68 to 0.70, and 0.70 is considered an acceptable level (Shuttleworth, 2009). Content validity is supported based on the relationship between the CCTST and the APA Delphi research. Concurrent validity has been supported between the CCTST and the Watson-Glaser Critical Thinking test ($p < 0.001$), the SAT verbal ($p < 0.001$) and math ($p < 0.001$) scores, and the Graduate Record Examination (GRE) ($p < 0.001$). The CCTST was specifically designed for use with college-aged students and has been used in previous research with undergraduate nursing students (Giddens & Gloeckner, 2005; Ingram, 2008; McCarthy et al., 1999; Shin et al., 2006; Thompson & Rebeschi, 2000). Therefore, the CCTST was the most valid and reliable tool to use to assess critical-thinking skills in nursing students (Zettergren & Beckett, 2004). The CCTST has 34 items, and the range of scores is from 0-34. A higher total score indicates more advanced critical thinking skills.

CCTDI. The CCTDI was designed for administration to the general adult population, particularly undergraduate students. The test includes 75 statements to which students either agree or disagree, and the test takes approximately 20-30 minutes to administer, with a maximum of 45 minutes. The total score is based on all 75 items, and there are also seven subgroup scores based on the seven dimensions. Higher scores on the CCTDI are positively correlated with a strong desire to apply critical thinking skills in decision-making and problem-solving (Insight Assessment, 2009). The CCTDI was developed by Facione and colleagues to measure critical thinking disposition (Shin, Jung, Shin, & Kim, 2006). The CCTDI uses the APA's Delphi Report "definition of critical thinking as the theoretical basis to measure critical thinking disposition" (Facione et al., 1994, p. 345). Seven aspects of critical thinking disposition were agreed upon and defined in the Delphi Report, and the CCTDI is the first instrument to measure those aspects (Facione et al.). Each of the aspects is measured on a subscale, and these seven subscales are truthseeking, open-mindedness, analyticity, systematicity, critical thinking self-confidence, inquisitiveness, and maturity of judgment (Facione et al.).

Based on the APA's Delphi research (Facione, 1990a), 19 dispositional phrases were developed by Facione and colleagues to describe the model critical thinker. Ten to fifteen pilot items were written for each phrase, and the items were screened for ambiguity by college-level critical thinking educators. The 150 items with the highest face validity were used on the experimental instrument, and it was piloted at two universities on a total of 164 diverse college students. Item-total correlations were used to eliminate questionable items from the 150 original items. In later empirical screenings, items were retained based on internal consistency and "ability to discriminate between respondents" (Facione et al., 1994, p. 347). Exploratory factor analysis was performed on the remaining items, and 75 items were retained that loaded highest

on the seven factors mentioned previously (Facione et al.). The mean loading for the seven factors ranged from .387-.528. This process supports the construct validity of the items and each of the seven subscales of the CCTDI (Bartlett & Cox, 2002).

Previous studies have determined the relationship between scores on the CCTDI and the CCTST. Highly significant correlations ($r=0.66$, $p<0.001$) between critical thinking disposition and critical thinking skills were demonstrated in all investigations (Facione et al., 1994), which supports the overall construct validity of the CCTDI. Alpha reliabilities in the initial pilot sample for the seven subscales ranged from .71 to .80, and the alpha reliability for the overall critical thinking dispositions was .91, indicating high internal consistency among items (Bartlett & Cox, 2002). The finalized 75-item instrument was administered later to 1019 freshman college students, and the alpha levels remained stable, supporting the internal reliability of the subscales (Facione et al.). The CCTDI has high internal consistency among items, supported internal reliability of subscales, and supported construct validity of the overall test, items, and subscales. The CCTDI has 75 questions, each of which are based on a six-point Likert rating scale with responses ranging from “strongly agree” to “strongly disagree.” Point scales are converted to scale scores using a standardization table. Subscale scores range from 10 to 60, and the subscales scores are added together to get the total score. The total score range is from 70 to 420, and higher scores indicate an overall strength in the disposition toward critical thinking (Thompson & Rebeschi, 2000).

There is considerable overlap between the concepts included in Paul’s model of critical thinking and the CCTDI, despite differing terminology (Reed, 1998). Table 3 below lists CCTDI subscales and definitions on the left and Paul’s related concepts on the right.

Table 3

Comparison of CCTDI and Paul's Concepts

CCTDI Subscales	Paul's Concepts
Truthseeking: "being eager to seek the best knowledge..., courageous about asking questions, and honest...about pursuing inquiry" (Facione et al., 1994, p. 346)	Intellectual Standards *fairness Intellectual Traits *intellectual integrity *perseverance *fair-mindedness
Open-mindedness: "being tolerant of divergent views with sensitivity to...one's own bias" (Facione et al., 1994, p. 346)	Elements of Reasoning *identifying assumptions *points of view Intellectual Standards *fairness Intellectual Traits *fair-mindedness
Analyticity: applying reason, using evidence to resolve problems, anticipating potential difficulties, being aware of the need to intervene, and connecting clinical observations with a theoretical knowledge base (Facione et al., 1994)	Elements of Reasoning *identifying concepts and theories
Systematicity: "tendency toward organized, orderly, focused, and diligent inquiry" (Facione et al., 1994, p. 346)	Intellectual Standards *clarity *depth *accuracy *breadth *precision *logic
Critical Thinking Self-Confidence: trusting in one's own reasoning and judgments and leading others to resolve problems (Facione et al., 1994)	Intellectual Traits *intellectual courage *confidence in reason
Inquisitiveness: a person's intellectual curiosity and desire for learning (Facione et al., 1994)	Intellectual Standards *depth *breadth Intellectual Traits *perseverance
Maturity of Judgment: the disposition of a person to be "judicious in ...decision making" (Facione et al., 1994, p. 346)	Intellectual Standards *logic Intellectual Traits *intellectual autonomy *intellectual integrity

In examining the CCTST and CCTDI instruments and Paul's model of critical thinking, it is evident there is overlap between concepts. All subscales measured on the instruments relate to Paul's concepts. All of the concepts in Paul's model are related to subscales on the CCTST and/or CCTDI.

Reflective Writing

In the current exploration, reflective writing skills were not measured, but specific guidelines were given to participants regarding their reflective writing assignments. Participants were asked specific questions about their experiences in the clinical setting. Reflective writing, as long as it is structured and focused, may promote critical thinking (McGuire et al., 2009). The reflective writing assignments were partially based on the NLN scenarios for Simulation in Nursing Education (2007) which are derived from the 2007 NCLEX-RN test plan (NCSBN, 2007), as well as on Paul's model.

Intervention

The intervention, the six reflective writing assignments (Appendix G), was implemented throughout the semester in the experimental group. There are 16 weeks in the semester, but students were only involved in the medical-surgical clinical rotation for the first 8 weeks of the semester. One exercise was implemented approximately every week. Approximately two weeks after the pre-intervention CCTST and CCTDI, I implemented the first reflective writing assignment. I sent the assignment link via SurveyMonkey to the participant's email address, which was provided on the demographic data form. I also sent test emails to all participants prior to the first assignment to ensure that I had the correct email addresses, and I received a reply response from all participants.

On the first assignment email, I informed the participants that I requested they complete the assignment within 72 hours and to contact me via email or phone with questions. The email included the link to the SurveyMonkey assignment (Appendix H). Once participants went to the SurveyMonkey link, they had an explanation of reflective writing, due date and time reminder, information about the length of the writing assignment, and a reminder not to share information about the study. The assignment followed and a reminder that I would send feedback before the next assignment was emailed, as well as a reminder about when the next assignment would be emailed (Appendix I).

A great deal of information is present in the literature recommending faculty feedback to students, but no recommended structure exists for this feedback. For the reflective writing assignments, the feedback included my personal response to their insight and description, questions to reflect on, and suggestions on how to increase depth, analysis, and synthesis in their reflective responses. Some participants chose to respond to the feedback, and some did not. If the participant responded to my feedback, I responded to them.

Approximately every week following the pre-intervention CCTST and CCTDI, I emailed the link to the writing assignment to each participant (See Appendix G for assignments). I continued to email feedback prior to sending the next assignment. Some participants had not experienced patient care situations with each problem included in the writing assignments. Participants were informed that, if they had not encountered the particular situation mentioned in the assignment, they could reflect upon a patient health problem during a recent clinical experience. Regardless of their clinical experience, they were to respond to the assignment answering the same questions.

Students at both institutions had clinical learning experiences two days per week for this course and did not have any concurrent clinical experiences for other classes. The clinical learning experiences were held in a medical-surgical unit at a local hospital, and the patients were typically age 50 or older with a variety of medical and surgical needs. Students functioned independently in the hospital setting, with the clinical instructor acting as a resource for questions and concerns and as an observer. Students at one institution were concurrently taking Caring for the Childbearing Family, and they had a Nursing Research course the previous semester. Students at the other institution were concurrently taking Pharmacology I, Health Promotion and Maintenance in the Community, and Professional Development, and they had not had a Nursing Research course. At one institution, students in the Medical-Surgical course completed reflections on their oncology and perioperative clinical experiences. At the other institution, students in the Medical-Surgical course completed reflections on their emergency room and operating room clinical experiences.

In the week after the final week of the clinical rotation, after all writing assignments were complete, the post-intervention CCTST and CCTDI were administered at the previously determined date and time to all participants, both control and experimental, in the same quiet, comfortable classroom setting as the pre-intervention CCTST and CCTDI. I distributed the CCTST and CCTDI to participants based on the assigned numbers, and upon completion, participants submitted tests to me at the front of the classroom. Later, I entered scores into the password-protected computer database.

Control

After completing the pre-intervention CCTST and CCTDI at the beginning of the semester, the members of the control group participated in all usual activities at their institution,

both didactic and clinical. These activities were the same activities in which the experimental group was participating. Control group participants did not receive the reflective writing interventions during the study. I sent email reminders to the control group about the time and location for the post-intervention CCTST and CCTDI.

Once data collection was complete, I contacted all members of the control group to invite them to complete the reflective writing assignments. I then emailed the first assignment to all those who wanted to participate. All six assignments were sent to the control group participants over the next eight weeks.

Data Analysis

The statistical analysis, performed using SPSS 18.0, used means and independent sample t-tests to compare baseline CCTST and CCTDI scores. A MANCOVA was performed to determine if there were group differences with regard to the average change in CCTST and CCTDI subscales while controlling for experience. MANCOVA was used because two groups were being compared (control and experimental) on more than one outcome (CCTST and CCTDI subscales and total score) and I wanted to control for the covariate of experience. Using MANCOVA allowed me to test multiple dependent variables with one tests, thereby reducing the risk of type 1 error.

The outcome measure of Wilks' lambda was used to "represent the product of the unexplained variances" or error variance (Munro, 2005, p. 183). Individual ANCOVAs were performed to determine which CCTDI subscales differed, and an ANCOVA was performed to determine if changes in CCTST and CCTDI total scores differed between groups while controlling for experience. I assumed that more months of health care experience might increase scores on CCTST and CCTDI, so this covariate was explored.

The demographic data gathered from participants were analyzed using SPSS 18.0. The sample was categorized using descriptive statistics, including means, standard deviations, percentages, and frequency counts. Demographic data included age, gender, race, and amount of health care experience in months.

A power analysis is used to determine the minimum sample size needed for a study and to reduce the risk for type II errors. To determine sample size using a power analysis, it is necessary to know if the test is one-tailed or two-tailed, a significance criterion or alpha level, power, and mean and standard deviation for the instrument being used (Munro, 2005). For this study, since the intervention had never been used, a two-tailed test was used. It was necessary to use a two-tailed test to conclude if the intervention led to change in either the hypothesized direction or the opposite direction. Power was calculated using 0.05 alpha level, 90% power level, and a mean of 296.02 with a standard deviation of 4.3 on the CCTDI. For the covariate of experience, a correlation of $-.125$ with the total score and $-.077$ with the analysis subscale was used. A sample size of 50 was needed per group to establish that a 2.5 point difference from the Total Score mean was statistically significant at 90% power.

Threats to Internal Validity

The sample described is a sample from two universities. The participants may not be representative of the entire population of BSN students. There is also a possibility that data quality will suffer due to the Hawthorne effect. The Hawthorne effect refers to participants' CCTST and CCTDI scores changing because they were participating in a study (Depoy & Gitlin, 2005). Scores could also change because participants completed the CCTST and CCTDI twice. In other words, participants may improve scores simply because they had completed the test previously. In addition, participants in the experimental group may have shared information

about the intervention with participants in the control group. In the informed consent and on each writing assignment, participants were directed to avoid discussing the study.

There were also participants who did not complete the study for various reasons. For example, one student, after completing the pretests, withdrew from nursing school because of health reasons. Two participants contacted me with their decision to withdraw from the study for personal reasons after completing the pretests. Six students completed the pretests, but no writing assignments or posttests. One participant completed the pretests and all writing assignments but did not take the posttests. For all of these situations, I used intent to treat analysis, substituting the participants' pretest scores for posttest scores.

One confounding variable could be the different experiences that the students had during the semester. Students at one institution were concurrently taking Caring for the Childbearing Family, and they had a Nursing Research course the previous semester. Students at the other institution were concurrently taking Pharmacology I, Health Promotion and Maintenance in the Community, and Professional Development, and they had not had a Nursing Research course. Also, students at both institutions participated in two similar reflective writing assignments about observations during their clinical rotations. These reflective writing assignments did not intentionally include any of Paul's concepts, however, and in future semesters, the students could benefit from the inclusion of Paul's concepts in the reflections. In addition, students were placed in various clinical locations with different clinical instructors. Because of this, some students may have had more opportunities that promoted critical thinking. All clinical instructors were given similar clinical objectives by the course instructors to attempt to provide similar experiences to all students.

Intervention Fidelity

Intervention fidelity is defined as the “competent delivery of an intervention by the interventionist as set forth in the research plan” (Santacroce, Macarelli, & Grey, 2004, p. 63). Intervention fidelity includes how well the intervention was delivered, and competence, or how well-qualified the interventionist was to deliver the intervention as intended. To combat threats to intervention fidelity, I was available by phone or email if any questions needed to be answered; therefore, there was little “unsystematic variation in intervention delivery” (Santacroce et al., p. 64). I reminded students of my phone number and email address with each reflective writing assignment. I have prior experience as an interventionist, and I have experience as an educator at the university level. Because of this, I was capable of explaining the intervention so that participants understood the assignments. In addition, the reflective writing assignments were based on the NLN scenarios for Simulation in Nursing Education (2007) which are derived from the 2007 NCLEX-RN test plan (NCSBN, 2007) and on Paul’s model for critical thinking (Paul & Scriven, 1987).

Another part of the intervention was the feedback to participants. Luthy and colleagues (2009) recommend instructors provide thoughtful feedback to student writing, but an exhaustive literature review did not reveal any guidelines for faculty feedback. The feedback I gave to participants was relatively unstructured and focused on questions that participants did not address or did not address in-depth.

Ethical Considerations

The risks of participating in this study were minimal. First, I obtained IRB approval from the University of Tennessee, Knoxville and my study sites (Appendix J). In order to ensure protection from risk, all potential participants were informed of the study, both in writing, in an

informal document, and verbally, by the researcher. Participation was voluntary, with no consequences to students who declined participation or to participants who withdrew from the study. Consent forms and completed CCTST and CCTDI instruments will be stored in a locked cabinet in my dissertation chair's office for three years after the study's completion. Only the IRB, the dissertation committee, and I will have access to these forms. Participants were assigned a random number for the CCTST and CCTDI. Participants returned their CCTST and CCTDI to the front of the room when completed. The tests were scored by Insight Assessment Inc., and scores were then saved into a computer database which I protected with a password. I had a person who was not connected with the study to verify my data entry, and that person signed a confidentiality agreement (Appendix K). The same process was followed for the second CCTST and CCTDI administration. Course grades were not affected by participation or nonparticipation in the research, and students were informed of this both verbally and in writing. Incentives for participation included \$10 gift cards and the contribution to nursing knowledge. Participants received incentives immediately after the post-intervention CCTST and CCTDI. Participants were informed of this both in writing, on the informed consent, through email, and verbally. Reports to any future audiences will contain no student identifiers.

Chapter IV: Results

This experimental pretest-posttest design pilot study evaluated the effectiveness of a novel reflective writing intervention for improving critical thinking skills and dispositions in baccalaureate degree nursing students over the period of an eight-week clinical rotation. I developed this intervention based upon Paul's model for critical thinking and the NLN scenarios for Simulation in Nursing Education (2007) which are derived from the 2007 NCLEX-RN test plan (NCSBN, 2007). In this chapter, I describe the sample and setting in my study, including demographic similarities and differences. I also list the results of my writing intervention on critical thinking skills and dispositions, according to the CCTST and CCTDI and the tests' subscales.

Description of the Sample

The sample consisted of 70 junior nursing students, 34 from one institution, referred to as Institution One from this point forward, and 36 from institution two, referred to as Institution Two from this point forward. There were 36 participants in the control group and 34 in the experimental group. Of the control group, 19 (52.8%) were from Institution One and 17 (47.2%) were from Institution Two. Of the experimental group, 15 (44.1%) were from Institution One and 19 (55.9%) were from Institution Two. The majority of respondents (72.8%) were between the ages of 20 and 22, and 71.4% of total respondents had zero months of health care experience aside from clinical learning experiences required for nursing school. Months of experience for the entire sample ranged from 0-180 ($M=7.99 \pm 28.49$).

Table 4 below compares control and experimental groups and the two institutions on age and months of experience.

Table 4

Differences in Age and Months of Experience by Group and Institution

	Institution One		Institution Two		Control		Experimental	
	Age	Months of Experience	Age	Months of Experience	Age	Months of Experience	Age	Months of Experience
N	34	34	36	35	36	35	34	34
Mean	21.85	2.35	24.03	13.46	22.83	5.69	23.12	4.52
SD	2.16	6.53	6.35	38.98	5.27	24.45	4.52	32.33

Due to the non-normal distribution of measures, non-parametric statistical tests were performed for these variables to determine similarities between the control and experimental groups. According to the Mann-Whitney U test, there was no significant difference between control and experimental groups on age ($p=0.53$; $z=-0.63$) or on months of experience ($p=0.29$; $z=-1.06$). In addition the age and months of experience are consistent with trends seen at both institutions and in the general population of BSN students at four-year universities (Middle Tennessee State University Office of Institutional Effectiveness, Planning, and Research [OIEPR], 2010; University of Tennessee Office of Institutional Research and Assessment [OIRA], 2010).

Due to the non-normal distribution of both measures, non-parametric statistical tests were also performed for these variables to determine similarities between Institution One and Institution Two. According to the Mann-Whitney U test, there was no significant difference between Institutions One and Two on age ($p=0.22$; $z=-1.22$) or on months of experience ($p=0.18$; $z=-1.34$). In addition, the age and months of experience were consistent with trends seen at both

institutions and in the general population of BSN students at four-year universities (OIEPR, 2010; OIRA, 2010). The Mann-Whitney U was used because the distribution of both age and experience were not normally distributed, violating an assumption necessary to run a t-test (Munro, 2005). Both age and experience were not normally distributed (positively skewed) as evidenced in the figures below. Figure 5 shows age of participants, and Figure 6 shows months of experience of participants.

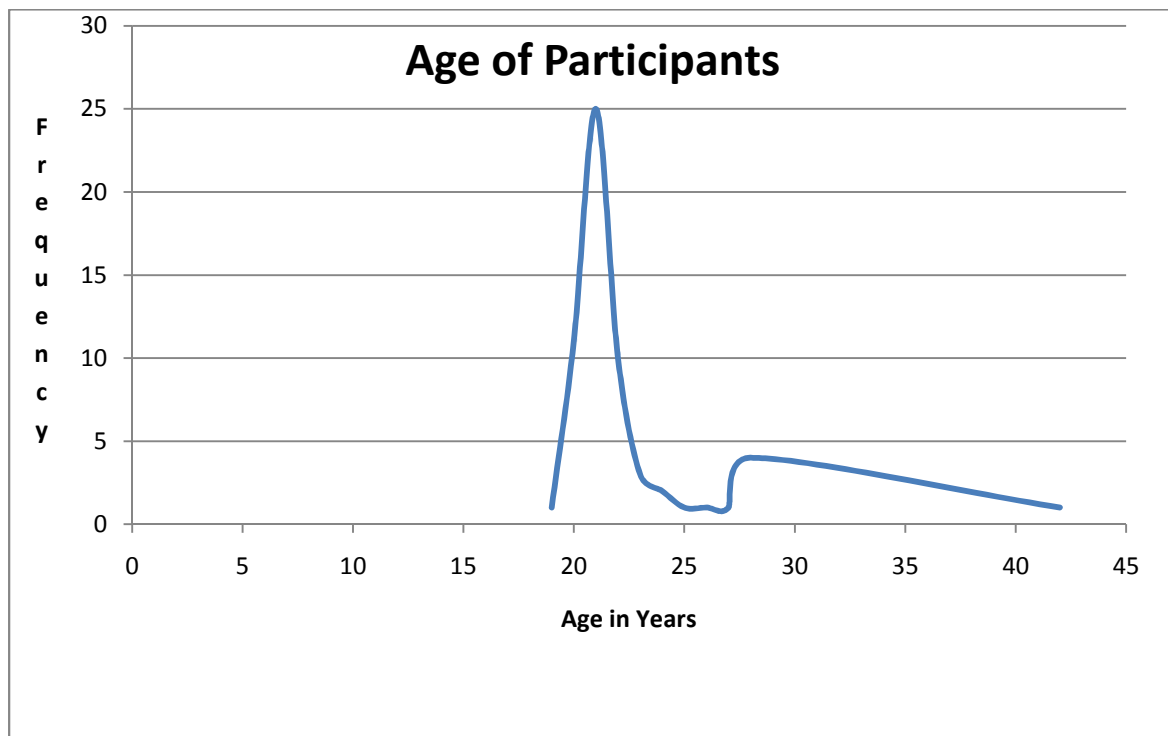


Figure 5. Age of Participants

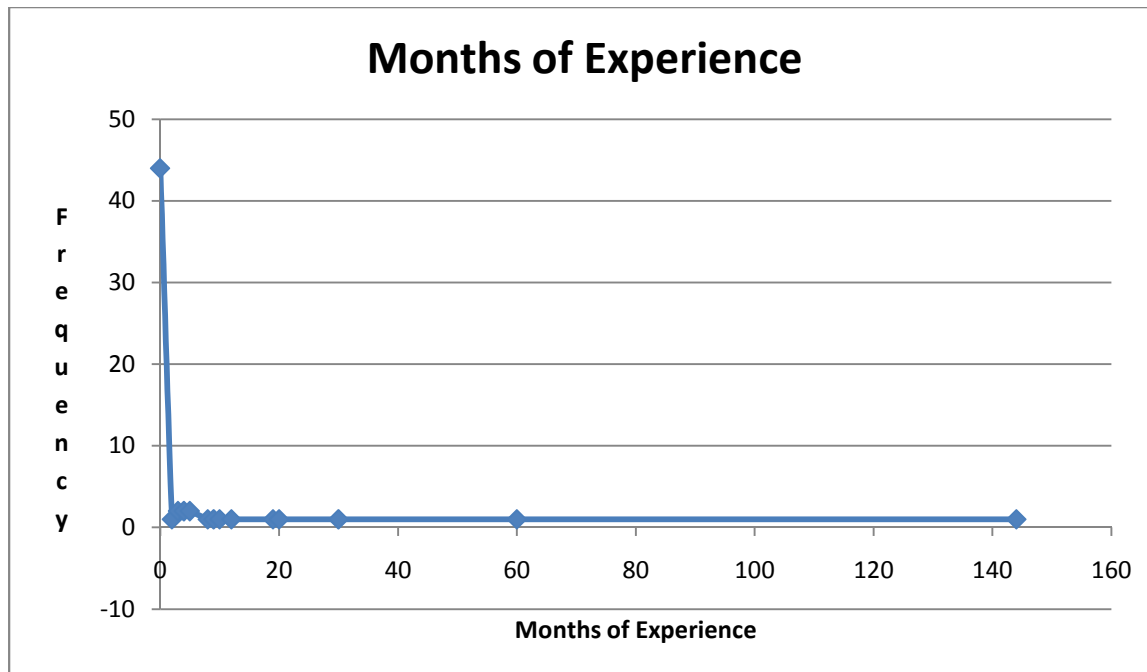


Figure 6: Months of Clinical Experience

For the sample, 88.6% of participants listed ethnicity as White, and 11.4% listed ethnicity as something other than white (Asian, Black, Black White, Hispanic, or White Mexican). For the sample, 63 participants were female (90%), and 7 participants were male (10%). These data are consistent with the population of nursing students at both institutions and in the general population of BSN students at four-year universities (OIEPR, 2010; OIRA, 2010). A summary of sample demographic attributes for control and experimental groups is provided in Table 5.

Table 5

Ethnicity and Gender Results for Control and Experimental Groups

	Control								Experimental							
	Male	Female	Asian	Black	Black White	His- panic	White	White Mexican	Male	Female	Asian	Black	Black White	Hispanic	White	White Mexican
Fre- quency	3	33	1	2	0	0	32	1	4	30	0	2	1	1	30	0
Percent	8.3	91.7	2.8	5.6	0	0	88.9	2.8	11.8	88.2	0	5.9	2.9	2.9	88.2	0

A summary of sample demographic attributes for Institution One and Institution Two is provided in Table 6.

Table 6

Ethnicity and Gender Results for Institution One and Institution Two

	Institution One				Institution Two			
	Non-white	White	Male	Female	Non-white	White	Male	Female
Frequency	0	34	2	32	7	29	5	31
Percent	0	100	5.9	94.1	19.4	80.6	13.9	86.1

Chi-square analysis was used to determine if there were significant differences between control and experimental groups on gender and ethnicity and Institution One and Two on gender and ethnicity. Chi-square analysis is a non-parametric statistical test used because gender and ethnicity were categorical variables. According to the chi-square analysis, there is no significant difference between control and experimental groups on gender ($p=0.63$; $\chi^2=0.23$). And there

were no significant differences between control and experimental groups on ethnicity ($p=0.93$; $\chi^2=0.01$). Also, there is no significant difference between Institution One and Institution Two on gender ($p=0.26$; $\chi^2=1.25$). There is a significant difference between Institution One and Institution Two on ethnicity ($p=0.01$; $\chi^2=7.35$). Due to the small distribution of the demographics in this study (small percentage of males and non-whites and a small variation in age and months of experience), however, description of the demographic variables is limited.

Results of Hypothesis Testing

Both the CCTST and CCTDI contain subscales that measure several critical thinking attributes. The CCTST contains the following subscales: inductive reasoning, deductive reasoning, analysis and interpretation, inference, and evaluation and explanation. The CCTDI includes the following subscales: truthseeking, openmindedness, analyticity, systematicity, confidence, inquisitiveness, and maturity. All of the pre-intervention measures, including CCTST and CCTDI total scores and subscale scores, were compared between the control and experimental groups to determine any differences in baseline. This information is outlined in Table 7 below.

Table 7

Differences in Baseline Measures

	Control			Experimental				
CCTDI	Mean	SD	SEM	Mean	SD	SEM	t	p
Truthseeking	38.94	7.11	1.19	38.47	4.36	0.75	0.33	0.74
Openmindedness	43.06	5.79	0.96	43.26	4.67	0.80	-0.16	0.87
Analyticity	47.53	5.03	0.84	45.09	6.32	1.08	1.79	0.08
Systematicity	42.94	5.64	0.94	43.82	6.57	1.13	-0.60	0.55
Confidence	43.97	6.78	1.13	42.79	6.77	1.16	0.73	0.47
Inquisitiveness	46.97	6.69	1.12	47.71	6.49	1.11	-0.47	0.64
Maturity	45.31	6.76	1.13	46.44	4.69	0.80	-0.81	0.42
Total	308.72	29.72	4.95	307.59	26.16	4.49	0.17	0.87

	Control			Experimental				
CCTST	Mean	SD	SEM	Mean	SD	SEM	t	p
Inductive Reasoning	10.06	2.38	0.40	10.06	2.01	0.35	0.01	0.96
Deductive Reasoning	8.17	2.97	0.50	8.21	2.88	0.49	-0.06	0.99
Analysis & Interpretation	3.94	1.39	0.23	3.91	1.31	0.23	0.10	0.92
Inference	9.83	2.76	0.46	9.47	2.69	0.46	0.56	0.58
Evaluation & Explanation	4.44	1.83	0.31	4.88	1.72	0.30	-1.03	0.31
Total	18.22	4.92	0.82	18.26	4.32	0.74	-0.04	0.97

There were no significant differences pre-intervention between the control and experimental groups on total CCTST, total CCTDI, or any of the subscales. The possible range for total CCTDI scores is from 70 to 420. Total CCTDI mean score for the control group was 308.72 ± 29.72 , and total CCTDI mean score for the experimental group was 307.59 ± 26.16 . The experimental group mean was 47.5 ± 5.39 , and the control group mean was 44.6 ± 6.4 . The range for total CCTST scores is from 0 to 34. Total CCTST mean score for the control group was 18.22 ± 4.92 , and total CCTST mean score for the experimental group was 18.26 ± 4.32 .

Next, differences were calculated for total CCTST, total CCTDI, and all of the subscales by subtracting pre-intervention scores from post-intervention scores. This difference measures the amount of increase or decrease in the total scores and each of the subscales. Then, using MANCOVA, total scores and each set of subscales were tested for differences between control

and experimental groups with regard to the average change in total scores and subscales while controlling for experience.

According to the Wilks' lambda results, a significant difference was found ($p=0.03$; $f=2.51$) between control and experimental groups. This indicates that at least one CCTDI subscale differed by group. The observed power for this difference was 0.84, and 0.8 or higher is optimal. In order to determine which of the CCTDI subscales differed between groups, individual ANCOVAs were performed. These results are provided in Table 8 below.

Table 8

Individual ANCOVAs for CCTDI Subscales

	Control	Experimental		
	Mean	Mean	p	Observed Power
Truthseeking	-1.14	1.14	0.03	0.59
Openmindedness	-0.33	-0.63	0.77	0.06
Analyticity	-0.94	-0.09	0.37	0.14
Systematicity	0.17	-1.46	0.11	0.37
Confidence	0.64	0.85	0.85	0.05
Inquisitiveness	0.07	-1.92	0.09	0.39
Maturity	0.01	-1.31	0.27	0.20

There was a significant difference ($p=0.03$) in one subscale: truthseeking. The control group decreased on average by 1.14 while the experimental group increased by 1.14. This indicates that the experimental group, who completed the reflective writing interventions, had a significant increase in truthseeking abilities when compared to the control group, who did not complete the reflective writing interventions. Truthseeking is defined by Facione et al. (1994, p.

346) as “being eager to seek the best knowledge..., courageous about asking questions, and honest...about pursuing inquiry.” An ANCOVA was also performed to determine if the change in CCTDI Total score differed between groups while controlling for experience. This information is detailed in Table 9 below.

Table 9

ANCOVA for CCTDI Total Score

	Type III Sum of Squares	df	Mean Square	f	p	Observed Power
Corrected Model	102.07	2	51.03	0.14	0.87	0.07
Intercept	337.26	1	337.26	0.89	0.35	0.15
Months of Experience	32.09	1	32.09	0.09	0.77	0.06
Control/Experimental	61.92	1	61.92	0.16	0.69	0.07

No significant difference ($F=0.16$, $p=0.69$) was found when comparing control and experimental group differences on CCTDI total scores. For the CCTST, using MANCOVA, total scores and each set of subscales were tested for differences between control and experimental groups with regard to the average change in total scores and subscales while controlling for experience. Results for the CCTST are in Table 10 below.

Table 10

MANCOVA Results for CCTST

	Value	f	p
Intercept	0.96	0.65	0.63
Months of Experience	0.98	0.40	0.81
Control/Experimental	0.92	1.35	0.26

According to the Wilks' lambda results above, no significant group difference was found ($F=1.35$, $p=0.26$). This means there were no significant differences between the control and experimental groups with respect to the CCTST subscales. In order to determine the CCTST subscales' difference between groups, individual ANCOVAs were conducted. These results are provided in Table 11 below.

Table 11

Individual ANCOVAs for CCTST Subscales

	Control			Experimental		
		95% Confidence Interval			95% Confidence Interval	
	Mean	Lower Bound	Upper Bound	Mean	Lower Bound	Upper Bound
Inductive	0.01	-0.63	0.64	0.44	-0.21	1.08
Deductive	0.19	-0.51	0.88	-0.22	-0.93	0.49
Analysis	0.38	0.02	0.74	0.05	-0.32	0.41
Inference	-0.22	-0.98	0.53	0.05	-0.71	0.81
Evaluation	0.03	-0.55	0.61	0.12	-0.47	0.71

Although none of the CCTST subscale scores changed significantly, the experimental group's scores increased on four of the five subscales. In addition the experimental group's scores were higher than the control group's scores on three of the five subscales.

An ANCOVA was also performed to determine if the change in CCTST Total score differed between groups while controlling for experience. This information is detailed in Table 12 below.

Table 12

ANCOVA for CCTST Total Score

	Type III Sum of Squares	df	Mean Square	f	p
Corrected Model	102.07	2	51.03	0.14	0.87
Intercept	337.26	1	337.26	0.89	0.35
Months of Experience	32.09	1	32.09	0.09	0.77
Control/Experimental	61.92	1	61.92	0.16	0.69

No significant difference ($F=0.16$, $p=0.69$) was found when comparing control and experimental group differences on CCTST total scores. Finally, a sample size estimate was conducted to determine what sample size would be needed to detect a difference in the amount of change between groups. Because the amount of change for both groups was similar, the estimates are large. A sample size of 100 per group would allow detection of differences in approximately three of the tests' subscales, and a sample size of 318 per group would allow detection of differences in approximately 8 of the tests' 14 subscales. For the CCTST Total, the effect size was 0.002, and the observed power was 0.07. For the CCTDI Total, the effect size was <0.001 , and the observed power was 0.05.

Chapter V: Discussion

This study was an evaluation of the effectiveness of a reflective writing intervention, composed of six assignments, on the critical thinking skills and dispositions of junior-level baccalaureate nursing students. This was measured using the CCTST and CCTDI, using a pretest, posttest design, at two state-supported Tennessee universities. I hypothesized that baccalaureate nursing students' critical thinking skills and dispositions would increase following the intervention when compared to the no-intervention control group when controlling for previous health care experience. In this chapter, I interpret my results, detailed in Chapter Four, and relate those results to previous research about critical thinking, which is detailed in Chapter Two. I also describe strengths and limitations of the study, serendipitous findings, theoretical implications, nursing education implications, education policy implications, and recommendations for future research.

Findings

The hypothesis was that baccalaureate nursing students' critical thinking skills and dispositions would increase following an 8-week reflective writing intervention when compared to the no-intervention control group when controlling for previous health care experience. The experimental group participants' total scores on the CCTST and CCTDI, however, did not increase significantly following the intervention. The control group participants' total scores on the CCTST and CCTDI did not increase significantly from pre- to post-intervention test. The experimental group participants' scores on the CCTDI truthseeking subscale did increase significantly when compared to the control group, however.

When comparing control and experimental groups, the experimental group scored lower than the control group on pre-intervention CCTDI total score, although not significantly lower.

As mentioned in Chapter Four, of the control group, 19 (52.8%) were from Institution One and 17 (47.2%) were from Institution Two. Of the experimental group, 15 (44.1%) were from Institution One and 19 (55.9%) were from Institution Two. More students at Institution Two were currently employed than those at Institution One, and although this was providing them with valuable clinical experience, many of them expressed difficulty balancing their jobs with their home lives and school which made them more anxious. Because of this difficulty balancing work, home, and school and the increased anxiety, the employed students may not have devoted as much time, attention, or effort to the pretests. Because there were more students from Institution Two in the experimental group, this could explain some of the variability in scores between the control and experimental groups.

The majority of respondents (72.8%) were between the ages of 20 and 22. The control group age range was 19-49 years ($M=22.83\pm5.27$) while the experimental group age range was 20-42 years ($M=23.12\pm4.52$). The mean age of the experimental group participants was higher than the control group participants, although there was no statistically significant difference between control and experimental groups on age. There is no current research that has found a relationship between age and CCTST or CCTDI scores (Bartlett & Cox, 2002; Thompson & Rebesch, 2000); however, the nursing students in this study who were currently employed in the clinical setting were typically non-traditional students. Based on trends in nursing programs, non-traditional students have many responsibilities outside of school, such as employment, and this could have taken away from time and effort spent in reflection for the reflective writing activities. Because the students who deviated from the normal distribution for age may have had other responsibilities that decreased their focus on critical reflection throughout the intervention,

their scores on the two critical thinking instruments could have been lower than the younger students.

Hight (1996) describes significantly higher anxiety levels among non-traditional students when compared to traditional students. According to Hight, this anxiety stems from the combination of classroom, family, and financial responsibilities and the difficulty balancing the responsibilities. Those with higher anxiety levels tended to have lower GPAs as well, indicating a correlation between anxiety and classroom performance. The non-traditional students, the employed students, and the students balancing multiple responsibilities may have had higher anxiety levels, leading to poorer performance on the tests and/or less time and effort for critical reflection during the intervention.

The majority of respondents (71.4%) had zero months of health care experience aside from clinical learning experiences required for nursing school. Months of experience ranged from 0-180 ($M=7.99 \pm 28.49$). According to the Mann-Whitney U test, there was no significant difference between control and experimental groups on age ($p=0.53$; $z=-0.63$) or on months of experience ($p=0.29$; $z=-1.06$). The control group had a range of 0-144 months of experience ($M=5.69 \pm 24.45$) while the experimental group had a range of 0-180 months ($M=10.35 \pm 32.33$). Students in the experimental group had a higher mean number of months of clinical experience. Most of these students were currently employed, while some of them had experience in the clinical setting prior to the semester of data collection. Perhaps this extra responsibility could account for some of the variability in scores between the control and experimental groups, although there was no significant difference between the groups on months of experience.

For the control group, 88.9% listed ethnicity as White, while 11.1% of participants listed ethnicity as something other than White. For the experimental group, 88.2% listed ethnicity as

White, while 11.8% listed ethnicity as something other than White. Current evidence does suggest that White students have a tendency to score higher on the CCTST and/or CCTDI than Non-White students (Shin et al., 2006; Thompson & Rebeschi, 2000). Because there were slightly more White students in the control group, this could account for some of the difference in baseline scores for the two instruments, but according to the chi-square analysis, there is no significant difference between control and experimental groups on ethnicity ($p=0.93$).

For the control group, 91.7% of participants were female, and 8.3% were male. For the experimental group, 88.2% were females, and 11.8% were male. Current research does not support any differences on CCTST and CCTDI scores based on gender (Bartlett & Cox, 2002), and the difference between the control and experimental groups in this study is slight. According to chi-square analysis, there is no significant difference between control and experimental groups on these variables ($p=0.63$), so most likely this difference in groups does not contribute to any differences in baseline scores.

Total pre-intervention CCTDI mean score for the control group was 308.72 ± 29.72 , and total pre-intervention CCTDI mean score for the experimental group was 307.59 ± 26.16 . This non-significant difference can be accounted for by the institution, age, ethnicity, and health care experience differences between the control and experimental groups.

Students at Institution One had taken an Introduction to Nursing class, Health Assessment, Foundations of Professional Nursing Practice, Pathophysiology of Health Deviations, and Transcultural Nursing, as well as all non-nursing University requirements, prior to the semester of data collection. Students at Institution Two had taken Professionalism in Nursing, Pathophysiology, Health Assessment, Health and Gerontology, Introduction to Nursing Practice, Health Care Research, and Clinical Pharmacology, as well as all non-nursing

University requirements. Although students at Institution Two had more nursing hours prior to the study, some courses were different than those at Institution One. Courses such as Transcultural Nursing and Foundations of Professional Nursing Practice could have increased the ability of Institution One's students to apply reason and connect clinical observations with theory.

In addition, faculty at Institution One are more likely to be doctorally-prepared than those at Institution Two. At Institution One, 83% of faculty members are doctorally-prepared (OIRA, 2010) compared to 69.4% at Institution Two (OIEPR, 2010). The lead faculty member of the course at Institution One was doctorally-prepared, while the lead faculty member of the course at Institution Two was Masters-prepared. In a study by Giddens and Lobo (2008), doctorally-prepared faculty and those with more teaching and publication experience scored students' papers more critically than those without the doctoral degree and experience. Therefore, students at Institution One may have been exposed to more rigorous grading by faculty members throughout their freshman, sophomore, and junior years that motivated them to think more critically about their writing. This could have caused the participants at Institution One to score higher on pretests and posttests because of their prior and current motivation to critically think. Participants from Institution One could also have put more critical reflection into their writing due to their prior and current motivation by faculty members to think critically about writing.

Students at Institution One on average tend to have higher American College Testing (ACT) scores upon entrance to college than those at Institution Two. In 2009, at Institution One, ACT composite score average for first-time freshmen was 26.4 (University of Tennessee OIRA, 2010). In the same year at Institution Two, ACT composite score average for first-time freshmen was 22.2 (Middle Tennessee State University OIEPR, 2010). There is a strong positive

relationship between higher ACT composite score and higher college GPA and college success (Bleyaert, 2010). Because students from Institution One have higher ACT scores, on average, than those at Institution Two, they are more likely to have higher GPAs and higher retention and graduation rates. Participants from Institution One may make better grades due to their ability to think more critically than participants from Institution Two, and this could affect scores on the critical thinking instruments. Future research needs to investigate if having more doctorally prepared faculty and more writing throughout the curriculum would have an effect on critical thinking scores

According to the Wilks' lambda results, a significant group difference was found ($p=0.03$) between pre- and post-intervention scores on the CCTDI, indicating that at least one subscale differed by group. This difference was in the truthseeking subscale. The difference may be explained by accepting that students who received the intervention became more "eager to seek the best knowledge..., courageous about asking questions, and honest...about pursuing inquiry" (Facione et al., 1994, p. 346) due to the intervention. According to Paul, truthseeking encompasses the intellectual standard of fairness and intellectual traits of intellectual integrity, perseverance, and fair-mindedness. As suggested in the literature, the writing intervention may have helped nursing students to question if information they were receiving was true, valid, and accurate and may have helped them gain courage about asking questions of other health care providers (Allen et al., 1989; Emig, 1977; Luthy et al., 2009; McGuire et al., 2009).

Of the participants who scored in the top 10% on the truthseeking subscale on the pretest and posttest, some common characteristics were identified. Most of them also scored in the top 10% on the majority of the other subscales on the CCTDI, particularly on the analyticity subscale. This indicates that participants who are truthseekers also rank high among peers in

other critical thinking dispositions and that participants who excel at truthseeking also excel at analyticity, or applying reason, using evidence to resolve problems, anticipating potential difficulties, being aware of the need to intervene, and connecting clinical observations with a theoretical knowledge base. Also, four of the six participants who scored in the top 10% on the truthseeking subscale had the largest number of months of experience in healthcare of any participants. This indicates that experience working in the healthcare setting can increase students' likelihood of seeking the best knowledge, being courageous in asking questions, and being honest when pursuing the truth.

I see potential for significance between control and experimental groups on two other subscales: inquisitiveness ($p=0.09$) and systematicity ($p=0.11$). For inquisitiveness, the control group increased by 0.07, and the experimental group decreased by 1.92. The difference could be because the students in the experimental group had a decrease in intellectual curiosity and desire for learning (Facione et al., 1994) while the control group had a slight increase. According to information in Paul's model, the intellectual standards of depth and breadth and the intellectual trait of perseverance increased more for the control group. Perhaps the reflective writing assignments and faculty feedback included in the intervention satisfied the students' intellectual curiosity before the post-intervention test, as described in Bowers and McCarthy (1993) and Drabick et al. (2007). Also, the control group participants may have had an increase in intellectual curiosity because they were not taking part in the writing assignments. The fact that these students were not receiving frequent writing assignments and faculty feedback while their classmates were may have stimulated their curiosity and made them want to learn more. In future research, it will be important to study the effect of not participating in an intervention on the inquisitiveness of participants. In addition, the control group consisted of more students from

Institution One than from Institution Two. Characteristics of Institution One participants include a greater percentage of females, greater percentage of White students, fewer months of health care experience, and younger students. Future research needs to explore the relationship between these characteristics and scores on the inquisitiveness subscale.

For systematicity, the control group increased by 0.17, and the experimental group decreased by 1.46. The difference could be because the students in the control group had an increase in “tendency toward organized, orderly, focused, and diligent inquiry” (Facione et al., 1994, p. 346), or, based on Paul’s interpretation of systematicity, the intellectual standards of clarity, accuracy, precision, depth, breadth, and logic increased more for the control group. It is possible that the control group, because they were not completing the intervention, were able to organize and focus their thoughts and questions more clearly than the experimental group. Perhaps some component of the writing assignments or feedback contributed to the decrease in systematicity in the experimental group. There is evidence that students interpret writing assignments as difficult to understand and complete, stressful, and unenjoyable (McCabe, 1994; Sorrell et al., 1997; McGuire et al., 2009). The fact that students may feel this way about writing could have contributed to the lack of clarity, precision, and logic in those students who were completing multiple writing assignments. It will be important in future research to study the effect of writing assignments on students’ ability to be systematic and focused. Also, although there were several specific questions in each of the interventions and the questions were directed towards a specific patient scenario, the participants were allowed to write freely and without a great deal of direction and specific instruction. The feedback did not address the organization of the response. It is possible that this lack of emphasis on organization could have contributed to

the decrease in scores on the systematicity subscale. Again, future research needs to address the organization of writing assignments and feedback on the improvement of students' systematicity.

No significant difference ($F=0.16$, $p=0.69$) was found when comparing control and experimental group differences on CCTDI total scores, although the control group mean scores were three points higher than the experimental group mean scores. It can be concluded that the intervention, given under the listed circumstances, does not increase CCTDI total scores significantly when compared to the control group. Possible reasons why the control group scored higher than the experimental group will be explored in the next section.

In addition, neither group had significant improvements on post-intervention CCTDI scores when compared to pre-intervention CCTDI scores. One conclusion that can be drawn from this is that the eight-week time frame for the intervention may not have been long enough to produce significant changes in critical thinking disposition. In the study by Bartlett and Cox (2002), junior PT students completed the CCTDI at the beginning and end of the year. Significant increases did occur in scores from beginning to end, and the explanation provided for the change is that there is a heavy clinical component in the junior year. In addition, three studies (McCarthy et al., 1999; Thompson & Rebeschi, 2000; Giddens & Gloeckner, 2005) provide evidence that critical thinking disposition improves, according to the CCTDI, from program entry to program exit. Perhaps the one eight-week clinical rotation was not enough of a clinical component to produce an increase in critical thinking disposition as a whole. The one CCTDI subscale that increased significantly compared to the control group was truthseeking and in the study by Bartlett and Cox and the study by Thompson and Rebeschi, the greatest subscale increase from pre to posttest was truthseeking. Perhaps the eight week writing intervention produced similar truthseeking changes in nursing students as the clinical component did over one year in the study

by Bartlett and Cox and over the course of the nursing program in the study by Thompson and Rebeschi.

Total pre-intervention CCTST mean score for the control group was 18.57 (SD=4.49), and total pre-intervention CCTST mean score for the experimental group was 18.47 (SD=4.46). This difference, although slight, can be accounted for by the institution, age, ethnicity, and health care experience differences between the control and experimental groups. According to the Wilks' lambda results, there were no significant differences between the control and experimental groups with respect to the CCTST subscales when examining differences between pre- and posttest. Although none of the CCTST subscale scores changed significantly, the experimental group's scores increased on four of the five subscales, possibly due to the reflective writing interventions. In addition the experimental group's scores were higher than the control group's scores on three of the five subscales. It is possible that the intervention or feedback contributed to the changes in CCTST scores. Perhaps the added stress of completing the extra assignments while balancing coursework and home life contributed to the non-significant increases. Perhaps the feedback given was not in-depth enough to contribute to a significant increase in critical thinking skills, or participants may not have read or comprehended the feedback. Future research should investigate the best format and structure of faculty feedback for helping to increase critical thinking. It is also possible with both the CCTDI and CCTST that there were confounding variables affecting the scores. These will be discussed in the next section. Finally, the small sample size in the study could have contributed to the lack of significant findings.

No significant difference ($F=0.16$, $p=0.69$) was found when comparing control and experimental group differences on CCTST total scores. It can be concluded that the intervention, given under the listed circumstances, does not increase CCTST total scores significantly when

compared to the control group. These circumstances will be described in the next section. In the study by Bartlett and Cox (2002), junior physical therapy students completed the CCTST at the beginning and end of the year. Significant increases occurred in scores from beginning to end, and the explanation provided for the change is that there is a heavy clinical component in the junior year. In addition, three studies (McCarthy et al., 1999; Thompson & Rebeschi, 2000; Giddens & Gloeckner, 2005) provide evidence that critical thinking skills improve, according to the CCTST, from program entry to program exit. Perhaps the one eight-week clinical rotation was inadequate to produce an increase in critical thinking skills as a whole.

In addition, neither group had significant improvements on post-intervention CCTST scores when compared to pre-intervention CCTST scores. One possible conclusion that can be drawn from this is that the eight-week time frame for the intervention was not long enough to produce significant changes in critical thinking skills. It is not clear from this study if the time frame was too short, if the intervention itself was responsible for the lack of significant increases in scores, or if other issues, discussed in the next section, were responsible for the lack of significant increases.

Strengths and Limitations

This study had several strengths, the first of which is the innovative intervention format that was used. The writing intervention was based upon a review of literature concerning various reflective educational writing strategies such as reflection, journaling, triangulation, and faculty feedback. The intervention also included elements of Paul's model of critical thinking and is partially based on the NLN scenarios for Simulation in Nursing Education (2007) which are derived from the 2007 NCLEX-RN test plan (NCSBN, 2007). This is a strength because the intervention is based on information from the National League for Nursing, a well-respected

nursing organization, and the NCLEX-RN, which is the test that all nursing schools and faculty work to prepare nursing students for. The fact that the intervention includes this information is evidence of continuity between the intervention, nursing curricula, nursing organizations, and expected outcomes of nursing schools.

In addition, the assignments were delivered to the participants via email and submitted to me via SurveyMonkey to encourage participation due to convenience for participants. If assignments were conducted synchronously, it would have been difficult, if not impossible, to negotiate scheduling among participants. I believe, based on experience as an educator, that students would not have been as likely to participate if they had had to meet in person to complete assignments. Feedback was also sent to participants via email to allow students to read at their convenience, and I sent emails to all participants to remind them to read and study the feedback they were sent. Some participants chose to respond to the feedback, in which case I responded to questions and comments as needed. According to email and verbal feedback from participants and according to feedback from nurse educators who were not part of the study, the assignment instructions were clear and straight-forward. Following the post-intervention tests, several participants verbalized they enjoyed the intervention overall. They verbalized that they felt the amount of writing and time involved was reasonable, they felt the instructions and questions were clear, and they felt they were encouraged to reflect on important aspects of their nursing care. This information was submitted voluntarily by participants.

Because the assignments were provided over email and completed on SurveyMonkey, it was impossible to determine the length of time spent on each reflection. I recommended that participants spend at least 20 minutes on each assignment. Drabick and colleagues (2007) describe the minute paper, which requires students to complete five-minute, in-class writing

assignments and then discuss for approximately ten minutes. With the number of questions in each of the six assignments, I reasoned that students would need slightly longer than this to be able to reflect critically. I have also given writing assignments to students in the courses that I teach, and I have found that 20 minutes has been the minimum time that students could write to adequately answer questions of similar length and substance to the ones in my intervention. In my study, due to the fact that the participants were unsupervised in their completion, there was no regulation of time spent. If participants were supervised when completing assignments, it would have been possible to determine the length of time spent writing; however, it would still have been impossible to determine if the time spent writing was actually spent critically thinking about and reflecting on the clinical experience. The assignments required 300 or more words, and participants did meet this guideline, but there is no guarantee that participants put forth their best effort on the assignments. If students were not thorough or did not show evidence of critical thought and reflection, my feedback was intended to stimulate thought and reflection.

Overall, I believe the convenient format encouraged participation. In a study by Phadtare, Bahmani, Shah, and Pietrobon (2009), a random sample of 48 nursing students participated in two writing groups: 24 students in a group with standard writing guidance (used Microsoft Word and topics assigned in classroom setting) and 24 students in an on-line writing group (used PowerPoint presentations, Google Docs, email, and writing templates). The authors reported that the on-line scientific writing group performed significantly better than the standard writing guidance group in writing quality according to the Six Subgroup Quality Scale (SSQS), and students reported satisfaction with the online writing method. I received no complaints or questions about access of assignments, and no participants verbalized difficulty with the online format.

The sample size was large for a pilot study because, based on the sample size calculation prior to the study using 0.05 alpha level and 90% power level, a sample size of 50 was needed per group. This pilot study included 60% of the number of participants required by the power analysis. According to Julious (2005), a sample size of 12 per group should be the rule of thumb for pilot studies. After the initial invitation to the study, 85 students completed the informed consent. Sixty-nine students completed the pre-intervention CCTST and CCTDI, so 16 participants (19%) were lost between the informed consent completion and completion of the pre-intervention instruments. There are several reasons why this might have occurred. First, students may have had something taking place outside of school that required them to leave school before completing the instruments. At Institution One, I was not present on the day of pretest administration, so I was not there to encourage participation or to remind students of the pretests. In addition, students at both institutions may have decided to reconsider participation based upon school or other commitments.

Sixty-nine students completed the pre-intervention tests, and sixty completed the study, meaning they completed pretests, all six writing interventions, and the posttests. This is an attrition rate of 13% from beginning to end of study. The attrition rate was lower than I had expected, based on the fact that the study lasted eight weeks and consisted of six writing assignments that required time to complete while fourth-semester baccalaureate nursing students were intensely involved in nursing courses. I did email the students assigned to the experimental group who completed the pre-intervention tests but did not begin completing the writing assignments to remind them of their experimental group expectations. Of these nine students, three of them contacted me in return during the eight weeks to inform me of their withdrawal

from the study. Their reasons for withdrawing included commitments at home, other school commitments, and health issues which had resulted in withdrawal from the university.

Although not measured for this study, the reflective writing assignments provided a great deal of insight into the clinical experiences of junior-level baccalaureate nursing students. Students described accomplishments, fears, frustrations, situations that inspired them, experiences that made them question themselves and their knowledge, and patients that captivated them. The data provided in this study were rich with depth and thought and are an excellent basis for a future qualitative study. According to the reflections and to participant emails and verbal feedback, the assignments gave them an opportunity they may not have otherwise taken to think critically about their interactions with their patients. For example, one student sent an email saying, “I’m glad to have had the chance to participate in your study! Doing the writing assignments has really made me reflect on my clinical experiences and look at what I did and what I could have done.” Other students verbalized that they enjoyed the assignments because they realized how much they had learned in such a short amount of time.

This study also had some limitations. One limitation of this study is that different institutions have different demographic characteristics, even if the institutions have similar Carnegie classifications, similar size, and similar geographic locations, and these differences must be accounted for. Because there were more students from Institution One in the control group and more students from Institution Two in the experimental group, this could have affected the results. As mentioned previously, students from Institution One tend to have higher ACT scores and more instruction by doctorally-prepared faculty, which could have affected test scores. In addition, the students at each institution had different opportunities for critical thinking due to varied clinical experiences. Because of this, some students may have taken the

opportunity to reflect on and/or critically think about their experiences outside of the assigned reflections. It is unknown how many of the participants in the control and experimental groups critically reflected on their clinical experiences, so their independent oral and/or written reflections may have caused undocumented variation in test scores. Students had different critical thinking opportunities even if they were at the same institution and even in the same clinical groups due to the unique qualities of available patient populations. In the future, a mixed modeling approach could be used, which would help control for these individual experiences.

Another limitation of this study was the variation in feedback given to participants during the intervention. I gave feedback to all participants on each writing assignment. Some participants chose to respond to the feedback, while others did not. If participants responded to feedback, then I responded to them; therefore some participants received more interaction and dialogue with the researcher than others. Future studies will need to include more specific guidelines about the researcher feedback to participants.

Another limitation of this study was that the intervention lasted eight weeks and consisted of six writing assignments. On one hand, the students who chose not to participate in the study and those who withdrew from the study may have done so because the study took place over an entire half semester. The junior year in both nursing programs is intense and extremely busy with clinical rotations, observations, and complex didactic material, and there may have been hesitancy to participate due to the nursing student schedule. On the other hand, it may have been beneficial to have a longer intervention, consisting of more writing assignments. Studies by McCarthy and colleagues (1999), Thompson and Rebesch (2000), and Giddens and Gloeckner (2005) showed significant increases in critical thinking abilities over the course of a nursing program. Eight weeks is not a long time in comparison to the typical three-year nursing program,

and it simply may take more time than eight weeks for critical thinking skills and disposition to improve significantly. Also, this intervention is new, so this is the first time it has been tested. It may have been more beneficial for students to engage in more writing assignments than six over the course of the intervention.

In addition, there were some limitations in this study involving control of the study environment. For example, at Institution One, a member of my dissertation committee administered the pre-intervention tests. Although she was experienced in intervention administration, had step-by-step instructions for administration, and had access to me throughout the tests, the results could have been affected by the fact that I was not physically present. At Institution Two, the pre-intervention tests were administered by me, except for six tests for students who were unavailable during the time of test administration. A proctor administered tests to these six students the following day. Although I was on speakerphone and available for any questions or comments, this could have affected the quality of results. Originally, I had planned to be physically present to administer pre- and post-intervention tests. Due to student scheduling issues, I had to use proctors for some test administration. Participants may have been more reluctant to participate since the PI was not present, and they may have been intimidated or stressed during the tests since the proctors were faculty members at their institutions (although not currently). I administered post-intervention tests at both institutions, which helped to increase fidelity and reliability.

Although pre-intervention tests and post-intervention tests were given under similar circumstances at both institutions, there were differences that could have affected results. For example, although workload was similar according to course instructors, different assignments at the two institutions could have affected perceived or actual student workload. Also, at the time

that pretests were administered at both institutions, students had just returned from a month-long break from school. At both sites, the pre-intervention tests were administered after a multi-hour lecture class on the second day of the term. There was compression of events due to schedules beyond our control that may have affected ability to concentrate, patience, or stress levels.

As far as post-intervention tests, there were several extraneous factors that could have affected the results. Students at both institutions were completing mid-term examinations and numerous assignments during the week that I administered the posttests. Posttests were administered during the last week of the eight-week clinical rotation, in the days directly prior to spring break. The days that I administered the posttests were the only dates that students would be on-campus as an entire group before spring break. I wanted to complete the posttests prior to spring break so as to not add an additional week's time without any required clinical or reflective activity before the posttests. Adventitious events at both campuses could have affected student performance. At Institution One, posttests were administered at two separate times in the late afternoon, after students had been in class since morning, and after they had completed an exam in an afternoon class. Participants commented on the stress that they had been under in the past few days. At Institution Two, posttests were administered in the late morning after a class. During the previous night, a fatal stabbing had occurred near campus that involved a student athlete. It is unclear how this affected participants' posttest results, but it is probable that the incident was on the minds of many of the students and could have affected participants' emotional states.

Serendipitous Findings

Because a new intervention was used in this study, particular attention was given to participants' reactions to the intervention and to recruitment of participants. As mentioned

previously, participants' verbal and email comments about the writing assignments were positive. Participants at both institutions commented that the intervention was understandable, at least somewhat enjoyable, and not overly stressful on top of their other class assignments. During posttest administration, however, participants commented on the general stress they felt due to classroom assignments, clinical responsibilities, and duties at home and work. At both institutions, participants seemed overall more taxed than they had during pretest administration.

As far as recruitment of participants, faculty members at each institution allowed me to come invite students to participate. There were incentives at each institution, such as the use of writing assignments in a required portfolio, the potential to use the research study participation on a resume, and the gift card. The majority of qualified students at each institution chose to participate. Participants stated the use of the writing assignments in their required portfolios was the biggest draw for them to participate. When given their gift card after completion of the post-intervention tests, approximately 25% of students stated they had forgotten that a gift card was an incentive for participation. This was evidence that students participated in the study and completed the intervention without considering the gift card incentive. Perhaps the portfolio was enough of an incentive for them to participate, and possibly students wanted to participate solely to make a contribution to nursing research.

Faculty gatekeepers at each institution were very helpful in determining times for recruitment and testing activities. Students at both institutions were not on-campus as a group very often during the week. Faculty members helped me to decide on the best, most productive options for my necessary activities. Although the testing times were not ideal, they did allow some control of environment and timing.

Finally, a great deal of insight was uncovered regarding nursing students' experiences in the clinical setting. As mentioned previously, the writing assignments were not measured or scored during this study. I did take at least 20 minutes to provide meaningful, stimulating feedback to each experimental group participant's writing assignment each week. I asked questions of the participants, prompting them to provide more information, elaborate on specific themes, explore why they reacted certain ways, and discover how they could respond differently. I commented when they neglected one of Paul's concepts or when they struggled to grasp what I wanted them to write about. In addition, I encouraged them through email to read and focus on my comments each week.

Theoretical Implications

Although no statistically significant difference was found between pretest and posttest scores in the experimental group, I believe Paul's model for critical thinking is ideal to use in connection to writing assignments in nursing education. The intellectual standards and elements of reasoning of Paul's model are closely related to writing skills that are emphasized at every educational level. For example, Paul's intellectual standards include clarity, accuracy, precision, relevance, depth, breadth, logic, and fairness. When students are writing any type of assignment, they are instructed to be clear in their writing, accurate in documentation, precise about details, relevant regarding the events, deep in their analysis, all-inclusive of specifics, logical in argument or evaluation, and fair in presenting sides.

His elements of reasoning include purpose, question, information, interpretation and inference, concepts, assumptions, implications and consequences, and point of view. When writing, students are instructed to formulate a purpose statement, determine a question they are trying to answer, provide supporting information, interpret the data and draw inferences based on

it, pinpoint concepts that are applicable, make some assumptions based on the information they have collected, determine consequences that could come from this interpretation, and recognize a point of view from which they are writing and thinking.

In addition, Paul's model includes the intellectual traits of intellectual humility, intellectual autonomy, intellectual integrity, intellectual courage, perseverance, confidence in reason, intellectual empathy, and fair-mindedness. Although these traits may not all be applicable during every writing assignment given to a student, they can be useful in writing. Particularly when writing persuasive, argumentative papers or assignments where they have to present a side of an issue, students must exercise these traits. For example, students must be able to confidently persuade readers of their reasoning, courageously defend their statements, and be fair in presenting all sides of an issue.

Overall, Paul's model has important connections to writing and can be used to guide written assignments at all levels of education. The model provides an organized, thorough thinking process that students can follow when writing. According to the WTL model, writing is actually a process that produces learning, so Paul's model of critical thinking used to guide writing has the potential to create outcomes of learning with a background of critical, deep thought.

Nursing Education Implications

Overall, students reported a positive experience with the writing assignments. Several students mentioned that they enjoyed the opportunity to reflect on their clinical experiences and that they were encouraged to think more deeply about their clinical skills and their patients than they would have without the assignments. Based on this feedback and the depth and emotion detected in the students' responses, I believe it is imperative to include reflective writing in

nursing courses. As mentioned previously, I also believe that Paul's model is an effective guideline for nursing students' writing and should be incorporated into the reflective writing assignments.

Another result of this study is validation of the large amount of time required for faculty in giving feedback on writing assignments. I spent at least 20 minutes per writing assignment providing meaningful feedback. I read 30 assignments per week and a varying number of student responses to my feedback, and there were six total assignments. These assignments were no less than 300 words, and many were much longer. In addition, many written assignments in nursing courses are required to be much longer than this. Possible suggestions for providing faculty feedback more efficiently and effectively include using a rubric (Kennison, 2006) and requiring short written assignments (Drabick et al., 2007).

Recommendations for Future Research

One previously mentioned possibility for future research is the analysis of the qualitative data in this study. A large amount of qualitative data was produced from the study, and the data could be analyzed to determine reflective themes among nursing students regarding their clinical experiences. This analysis would help nurses and educators to understand students' emotional, physical, and spiritual experiences with clinical patient care.

Also, it would be very beneficial to attempt this study with a larger sample, over a longer period of time, with different groups of students, and with more reflective writing assignments. It is not clear from this study if the time frame was too short, if the intervention itself was responsible for the lack of significant increases in scores, or if other issues were responsible for the lack of significant increases. As mentioned previously, a sample size of 100 per group would allow detection of differences in approximately four of the tests' subscales, and a sample size of

285 per group would allow detection of differences in approximately 8 of the tests' 14 subscales. The study could also be conducted over a longer period of time, possibly an entire year, in order to determine if length of time affects changes in scores on the critical thinking tests. If a longer study was performed, the posttests could be administered at the semester or year's end in order to avoid the mid-term stress and busy schedule. It would also be beneficial to conduct the study with sophomores, juniors, and seniors and compare critical thinking scores among levels of the nursing program. Also, the study could be conducted with more than six writing assignments to determine if more writing would affect test results and with different writing assignments, such as assignments based upon other critical thinking models.

In addition, this study needs to be performed with groups of students that contain more diversity in age, gender, ethnicity, and months of experience. There was a small distribution in the demographics in my study, so I was unable to adequately describe the relationship between gender, ethnic group, age, and months of experience and critical thinking skills and disposition. For future studies, equal numbers of males and females and equal numbers of whites and non-whites could be tested. Also, a wide range of ages of participants and a wide range of months of experience for participants could be examined. In addition, an idea for future research is to look at the educational level and income of parents of baccalaureate nursing students. Correlations could be determined between critical thinking scores and parents' educational level and income.

Another possibility for future research is for critical thinking to be measured based on evidence of critical thinking in the clinical setting, instead of measuring it with the CCTST and CCTDI (Rooda & Nardi, 1999). Perhaps an evidence-based rubric could be developed, outlining necessary actions, attitudes, and skills for students to exhibit to demonstrate critical thinking. Then, nursing students could be observed and measured based on the rubric. In addition, studies

could be conducted to explore rubrics for grading student writing assignments and to explore what format, structure, and elements should be included in faculty feedback.

The subscale analyticity was close to significance ($p=0.063$) between control and experimental with the experimental group scoring three points higher. There is a possibility that the characteristics of the control group, mentioned previously, may be the cause for the differences in the analyticity subscale ($p=0.063$). For example, students from Institution One, which composed a larger percentage of the control group, may tend to be better at applying reason, using evidence to resolve problems, anticipating potential difficulties, being aware of the need to intervene, and connecting clinical observations with a theoretical knowledge base (Facione et al., 1994), thereby demonstrating Paul's Element of Reasoning, identifying concepts and theories. This could be due to the previous or concurrent courses the students at Institution One have taken, faculty instruction, or baseline student measures. In the future, it will be important to examine if characteristics of the control group are the cause for differences in the analyticity subscale.

As mentioned previously, in future research, it will be important to study the effect of not participating in an intervention on the inquisitiveness of participants. Future research needs to explore the relationship between Institution One students' characteristics and scores on the inquisitiveness subscale. It will be important in future research to study the effect of writing assignments on students' ability to be systematic and focused, and future research needs to address the organization of writing assignments and feedback on the improvement of students' systematicity.

Pilot Study Feasibility

For this pilot study, I was able to attract 70 students from two different institutions. The percentages of male and non-White participants were similar to the percentage of males and non-Whites in the population of baccalaureate nursing students. The attrition rate was 13% from beginning to end of study, which was lower than I had expected, based on the fact that the study lasted eight weeks and consisted of six writing assignments that required time to complete while fourth-semester baccalaureate nursing students were intensely involved in nursing courses. The incentives in my study included the potential for use of writing assignments in a required portfolio, the potential to use the research study participation on a resume, and a \$10 gift card. Several students forgot about the gift card incentive, so I assume that the use in portfolios and the use of study participation on a resume were the major incentives for most participants. Facilitators for this pilot study included the faculty gatekeepers who assisted me in scheduling meeting times with students, the convenient online format of the intervention, and the willingness of students to share their clinical experiences through writing. Barriers for this pilot study included the busy schedules of the junior nursing students, the inability of the researcher to be at both institutions simultaneously, and the extraneous circumstances that surrounded each student, such as stress in dealing with mid-term exams, emotional stress of campus situations, and preparation for spring break.

Education Policy Implications

This study, and future similar studies, could have an effect on education policy. For example, if studies are conducted that test reflective writing interventions over longer periods of time and significant results are found regarding increases in critical thinking, those writing interventions could become a foundational piece of nursing curriculum. If students complete

reflective writing interventions throughout the course of their nursing programs, and significant increases are found in their critical thinking skills and/or dispositions, similar interventions may be recommended for implementation in curricula worldwide. Teaching methods could be affected by these studies. Nurse educators could use results from this and similar studies to create innovative assignments that produce desired critical thinking outcomes. Faculty members may begin using more writing assignments and evaluation of writing rather than current evaluation techniques. Evaluation of graduating nurses' readiness for practice could even be based upon reflection, writing, and critical thinking as opposed to standardized testing, such as the NCLEX.

Conclusion

The importance of critical thinking as an outcome for students graduating from undergraduate nursing programs has been emphasized frequently. Application of critical thinking is necessary to improve patient health outcomes. Writing and reflective writing are strategies used by educators to increase learning. There is a lack of empirical evidence regarding the effectiveness of reflective writing interventions on increasing critical thinking skills. This study tested the effectiveness of a novel reflective writing intervention, based on Richard Paul's model of critical thinking, for improving critical thinking skills and dispositions in baccalaureate degree nursing students over the period of an eight-week clinical rotation. Although there was only one significant subscale increase between control and experimental groups from pre- to post-intervention tests, valuable information was gleaned from this study. Some differences in scores could be accounted for by the institution, age, ethnicity, and health care experience differences between the control and experimental groups. An innovative intervention which used a convenient format of administration, completion, and submission was implemented. Students overall had a positive reaction to the intervention, and they produced a large amount of

reflective, qualitative data. There are numerous opportunities for future research surrounding reflection, writing, and critical thinking, and nurse educators, nursing students, nurses, and patients will benefit from this research.

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APPENDICES

Appendix A: Study Plan

	Institution 1	Institution 2
Dates for Information Session	January 12	January 13
Pre-Intervention Test Date	January 13	January 14
Assignment 1 Sent	January 28	January 28
Assignment 2 Sent	February 4	February 4
Assignment 3 Sent	February 11	February 11
Assignment 4 Sent	February 18	February 18
Assignment 5 Sent	February 23	February 23
Assignment 6 Sent	February 27	February 27
Post-Intervention Test Date	March 7	March 3

Appendix B: Information Session Script

“I am inviting each of you to participate in a study for my dissertation that will help me in completing the requirements for my PhD. The study will consist of two short pretests, the California Critical Thinking Skills Test (CCTST) and California Critical Thinking Dispositions Inventory (CCTDI). These will be administered in a classroom here directly after your next class. Then, every one to two weeks I will email you an assignment via SurveyMonkey. This assignment will consist of a short reflective writing assignment. Reflective writing is defined as any assignment that is focused on an activity that students have experienced, such as class readings, clinical rotations, or group activities, that highlights what the student learned from the activity. You will be asked to answer some questions that encourage you to reflect on recent clinical experiences. The assignments will take approximately 20 minutes to complete. You will be required to submit at least one double-spaced typed page, and there will be a total of six writing assignments during the course of your eight-week clinical rotation. ([At Institution B only] You will be allowed to use these writing assignments in your required writing portfolio, and they will count for 4 of 12 points.). ([At Institution A only] You can use these writing assignments in your professional portfolio next year.) After completion of your clinical rotation, you will take two short posttests, the CCTST and CCTDI, in the same classroom here. Half of you who participate will be randomly assigned to the experimental group in this study. You will complete pretests, the reflective writing assignments, and the posttests. Half of you will be randomly assigned to the control group, and you will only complete the pretests and posttests. Upon completion of all exercises, you will receive a ten-dollar gift card to a local store or restaurant.”

Next, I will review the consent form and invite students to participate.

Appendix C: Demographic Questionnaire

Assigned Number:

University:

Email address:

Gender:

Age:

Ethnicity:

Total months of previous health care experience in a position providing direct patient care:

Appendix D: Informed Consent

INTRODUCTION

You are invited to participate in a research study about critical thinking. The study involves taking two tests at the beginning of the semester and then taking the same tests at the end of the clinical rotation and participating in six reflective writing assignments. The tests are the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI), and they do not require you to prepare or study. You will complete these tests/surveys near the beginning and end of your clinical rotation. The assignments will involve reflecting on your recent clinical experiences. The purpose of this study is to examine the effect of reflective writing exercises on critical thinking skills and disposition (attitudes) in junior baccalaureate nursing students. This study will help the researcher determine if reflective writing increases critical thinking skills and attitudes.

INFORMATION ABOUT PARTICIPANTS' INVOLVEMENT IN THE STUDY

For this study, you will be assigned to either a control group or an experimental group after you agree to participate. Your assignment to a group will be determined randomly by drawing names out of a hat. You are agreeing to participate regardless whether you are in the experimental group (receives the intervention) or the control group (will be offered the intervention after the research study is complete). Both groups will begin the study by taking the CCTST and CCTDI. The experimental group will participate in six reflective writing exercises throughout the course of this semester. At the semester's end, after all writing exercises are complete, all students will again take the CCTST and CCTDI. All students in the control group will be offered the reflective writing exercises and additional instruction about reflective writing at the semester's end.

Each CCTST and CCTDI test will take approximately 20 minutes to take, and each of the six reflective writing exercises will take approximately 30 minutes each. If you are in the control group, your total time commitment is expected to be less than an hour and a half. If you are in the experimental group, your total time commitment is expected to be approximately four and a half hours. These exercises will be completed individually using a computer and submitted to the researcher via SurveyMonkey. This entire study will be completed by April 15, 2011.

RISKS

Risks from participating in this study are minimal. Participation is voluntary, with no consequences if you don't participate or if you withdraw from the study. If you are in the group that is not assigned the reflective writing assignments, you will be offered the

exercises and instruction at the semester's end. CCTST and CCTDI scores will be confidential and coded by a randomly assigned number. The scores will be entered into a computer database, and the file will be password-protected. Only the principal investigator and the dissertation committee will have access to this document. Grades will not be affected by participation or nonparticipation in the research. Reports to any other audiences will contain no student identifiers.

BENEFITS

One benefit of participation in the study is the potential for an increase in critical thinking skills and/or attitudes. This benefit will be applicable for both the control and the experimental group, since both groups will be offered the intervention. In addition, you may learn about nursing research by participating in the study.

CONFIDENTIALITY

All information collected about you will be kept confidential. I will not share any of the information with anyone that is not directly related to the research study, except in the event that I use some of the data, without identifiers, for future research studies. This means that I will not share any of the information with your faculty or other students. No one will have access to the materials except the principal investigator, the dissertation committee, and the IRBs of this study or any future studies using this data. Completed questionnaires and consent forms will be stored securely in the office of the dissertation chair, Tami Wyatt. In addition, your confidential written responses may be used for later research studies. No reference will be made in oral or written reports which could link you to the study.

CONTACT INFORMATION

If you have questions at any time about the study or the procedures, you may contact the researcher, Jessica Naber, at [REDACTED], and [REDACTED]. If you have questions about your rights as a participant, contact the Office of Research Compliance Officer at (865) 974-3466.

_____ Participant's initials

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. One incentive, a 10-dollar gift card, will be presented to you for participation in the study. Another incentive is that you will have the option of using your written assignments as part of your nursing portfolio. If you decide to participate, you may withdraw from the study at any time without penalty. If you withdraw from the study before data collection is completed, and you would like your data returned to you or destroyed, you must send a written request to Jessica Naber using the contact information above.

CONSENT

I have read the above information. I have received a copy of this form. I agree to participate in this study.

Participant's name (Print) _____

Participant's signature _____ Date _____

Investigator's signature _____ Date _____

EXPEDITED APPROVED

DATE 12-17-2010
Brenda Lipton
Compliance Officer & IRB Administrator

Appendix E: Instructions for Test Administration

Proctor is to bring the following materials to the testing room:

1. Number 2 pencils.
2. Test booklets and CapScore response forms.

Before starting the session:

1. Ask test-takers to turn off cell phones.
2. Give pencils and tell them they can only use #2 pencil.
3. Remove everything else from desk.
4. Distribute test booklets and CAPSCORE forms for CCTST and CCTDI. Tell them not to open yet.
5. Instruct them not to fill in ID number and group number. You will provide that when they turn in to you.
6. They do not have to put their name and date, but they can if they want to.
7. The questions (gender, grade level, ethnicity) are optional. That information is already on the demographic questionnaires.
8. Select one answer for each question, which, in your judgment, is the BEST choice of the ones provided. For the CCTDI, the scale goes from left (agree strongly) to right (disagree strongly). Tell them to erase any stray marks or changed answers.
9. They may mark in test booklet.
10. They record answers by darkening only one bubble on the CAPSCORE response form.
11. They have 45 minutes to complete each test. There are 75 questions on the CCTDI and 34 on the CCTST, so they need to budget time.
12. If they finish early, they may leave quietly.
13. Ask them if they have any questions?
14. Tell them when time is beginning.
15. Tell them when time is up.
16. Bubble in id number on answer sheet.
17. Count test booklets and CAPSCORE forms.

Appendix F: IRB Form D

FORM D

**Status for Changes and/or Project Termination for Form B Approved
Research Involving Human Subjects**

Research Compliance Services
Office of Research
The University of Tennessee, Knoxville
1534 White Avenue
Knoxville, TN 37996-1529

1. IRB No.: 8391B
2. Principal Investigator: Jessica Naber
Department: Nursing
3. Mailing Address: [REDACTED]
City: [REDACTED] State: [REDACTED] Zip: [REDACTED]
4. Project Title: The Effect of Reflective Writing Interventions on Critical Thinking Skills and Dispositions of Baccalaureate Nursing Students

PLEASE CHECK THE APPROPRIATE BOX(S) BELOW (see instructions on next page):

5. ☒ Change of Project Title
6. ☒ Change of Principal or Co-Principal Investigator(s), Other Collaborators, Student Advisor
7. ☐ Change(s) to Project Which Affect Participation of Human Subjects
8. ☐ Change(s) to Informed Consent Forms and/or Assent Form(s)
9. ☐ Additional Locations for Conducting Project
10. ☐ Adverse Events
11. ☐ Project Completed -- Please Close the IRB Files.

12. SIGNATURES

Principal Investigator: Jessica Naber Date: 1/26/11
Student Advisor: Dan Hlyatt Date: 1/27/2011
Departmental Review*: _____ Date: _____
*(if required)

Rev. 01-19-2005

Appendix G: Assignments

The first assignment, based on the NLN's Surgical Scenario 3, will be a reflection on a patient with nausea, particularly post-surgical. The assignment will state: Reflect on a time when you encountered a patient with nausea or post-surgical nausea. For this assignment, determine the purpose of your writing and what issue you are writing about. Document what you observed and experienced in the clinical setting. What conclusions did you come to by the end of the experience? Describe anything you could have done differently during the experience. Did you apply any definitions, principles, or concepts that you have learned in the classroom? If so, what were they? What interventions did you implement? Did you notice any pre-existing assumptions that you brought to the experience? If so, what were they? What consequences does this experience have for you or your patient? From what point of view did your thoughts about this experience originate?

The second assignment, based on the NLN's Surgical Scenario 1, will be a reflection on a patient with a bone fracture. The assignment will state: Reflect on a time when you encountered a patient who had recently experienced a bone fracture. Describe how you cared for the patient, how you communicated with the patient, how you addressed the fracture, and what interventions you provided. Was there anything you could have done differently? Reflect on your overall feeling about this encounter. As you reflect on and write about this clinical experience, include the following standards: clarity, accuracy, precision, relevance, depth, breadth, logic, and fairness. Clarity means your writing will be clear, understandable, and accurate so the meaning can be grasped. You should be able to defend your statements' truth, and statements should be free from any distortion. Your statements should also be precise, with enough detail and specificity to make them easy to understand. The statements should be relevant, meaning they are connected to the question at hand. The answers to the questions should also have depth,

addressing all issues of the experience. The answers should also have breadth, meaning all points of view are considered, which indicates the answers are fair and complete. The answers should be logical, make sense, and mutually support one another. Statements should also be significant, meaning they are focused on what is important, not what is trivial. Finally, statements should also be fair, meaning they are not self-serving or one-sided.

The third assignment, based on the NLN's Medical Scenario 5, will be a reflection on a patient with diabetes. The assignment will state: Reflect on a time when you encountered a patient who was diabetic. When writing about this experience, address the following issues: When you were caring for the patient, were there any instances where you had to admit that you did not have the expertise to solve a problem? If so, describe. Did you feel that you held any prejudices that affected your judgments? If so, explain these prejudices. Describe how you were able to think through issues on your own. Did you have to stand up against any others who were making the wrong decisions? Describe any instances where you purposely were not looking out for your own self-interest when making decisions. Detail any instances where you listened and tried to understand other points of view. Describe any experience where you were willing to work through complexities with patience instead of giving up. Were there any moments where you were willing to change positions if evidence pointed to a different solution? Describe any times where you stood your ground on a particular decision. And finally, explain any instances where you gave alternate opinions consideration and did not allow self-interest to cloud judgment.

The fourth assignment, based on the NLN's Medical Scenario 1, will be a reflection on a patient with an infection, such as strep throat or pneumonia. The assignment will state: Reflect on a time when you encountered a patient who had an infection. For this assignment, determine

the purpose of your writing and what issue you are writing about. Document what you observed and experienced in the clinical setting. What conclusions did you come to by the end of the experience? Describe anything you could have done differently during the experience. Did you apply any definitions, principles, or concepts that you have learned in the classroom? If so, what were they? What interventions did you implement? Did you notice any pre-existing assumptions that you brought to the experience? If so, what were they? What consequences does this experience have for you or your patient? From what point of view did your thoughts about this experience originate?

The fifth assignment, based on the NLN's Medical Scenario 4, will be a reflection on a patient with chest pain. The assignment will state: Reflect on a time when you encountered a patient who was experiencing chest pain. Describe how you cared for the patient, how you communicated with the patient, how you addressed the chest pain, and what interventions you provided. Was there anything you could have done differently? Reflect on your overall feeling about this encounter. As you reflect on and write about this clinical experience, include the following standards: clarity, accuracy, precision, relevance, depth, breadth, logic, and fairness. Clarity means your writing will be clear, understandable, and accurate so the meaning can be grasped. You should be able to defend your statements' truth, and statements should be free from any distortion. Your statements should also be precise, with enough detail and specificity to make them easy to understand. The statements should be relevant, meaning they are connected to the question at hand. The answers to the questions should also have depth, addressing all issues of the experience. The answers should also have breadth, meaning all points of view are considered, which indicates the answers are fair and complete. The answers should be logical, make sense, and mutually support one another. Statements should also be significant, meaning

they are focused on what is important, not what is trivial. Finally, statements should also be fair, meaning they are not self-serving or one-sided.

The sixth assignment, based on the NLN's Medical Scenario 3, will be a reflection on a patient with respiratory problems. The assignment will state: Reflect on a time when you encountered a patient who was having difficulty breathing. When writing about this experience, address the following issues: When you were caring for the patient, were there any instances where you had to admit that you did not have the expertise to solve a problem? If so, describe. Did you feel that you held any prejudices that affected your judgments? If so, explain these prejudices. Describe how you were able to think through issues on your own. Did you have to stand up against any others who were making the wrong decisions? Describe any instances where you purposely were not looking out for your own self-interest when making decisions. Detail any instances where you listened and tried to understand other points of view. Describe any experience where you were willing to work through complexities with patience instead of giving up. Were there any moments where you were willing to change positions if evidence pointed to a different solution? Describe any times where you stood your ground on a particular decision. And finally, explain any instances where you gave alternate opinions consideration and did not allow self-interest to cloud judgment.

Appendix H: Email for Assignments

You have all been selected to be part of the experimental group in my research study. This means that each week, you will receive a writing assignment. There will be a total of SIX writing assignments. At the end of your clinical rotation, you will be asked to complete the two critical thinking posttests.

This assignment is due within 72 hours, so today's assignment is due by _____ night at midnight. Please follow the link below for instructions and the assignment. If you have any questions, please contact me at this email address or at 502-541-3011. If you have trouble with the link, please let me know. Thanks so much for your participation!

Link to Assignment:_____

Appendix I: SurveyMonkey Assignment Template

This is your (first, second, etc.) written assignment for my research study. Just as a reminder, this is a reflective writing assignment. Reflective writing is defined as any assignment that is focused on an activity that students have experienced, such as class readings, clinical rotations, or group activities, that highlights what the student learned from the activity. Please take time to reflect on your recent clinical experience, and keep the following guidelines in mind:

1. Submit this assignment within 72 hours of receiving it.
2. Please address all components of the assignment. Each assignment is a little different, so read carefully.
3. Please take at least 20 minutes to complete the assignment.
4. Please make sure the completed assignment is at least 300 words in length (one typed double-spaced page).
5. Do not share any information about this assignment with anyone else that is in the study.
6. If you have not encountered the particular situation mentioned in the assignment, you can reflect upon any patient health problem during a recent clinical experience.

Here is your assignment: ...

Please type your answer in the text box below (or cut and paste from another document).

Remember to save your responses for your portfolios. When you are finished, click done. I will send feedback to you before I send the next assignment. Expect the next assignment... Thanks for your participation!

Appendix J: IRB Approval

December 17, 2010

IRB#: 8391 B

TITLE: The Effect of Reflective Writing Interventions on Critical Thinking Skills

Naber, Jessica
Nursing
[REDACTED]

Wyatt, Tami
Nursing
[REDACTED]

Your project listed above has been reviewed and granted IRB approval under expedited review.

This approval is for a period ending one year from the date of this letter. Please make timely submission of renewal or prompt notification of project termination (see item #3 below).

Responsibilities of the investigator during the conduct of this project include the following:

1. To obtain prior approval from the Committee before instituting any changes in the project.
2. If signed consent forms are being obtained from subjects, they must be stored for at least three years following completion of the project
3. To submit a Form D to report changes in the project or to report termination at 12-month or less intervals.

The Committee wishes you every success in your research endeavor. This office will send you a renewal notice (Form R) on the anniversary of your approval date.

Sincerely,


Brenda Lawson
Compliances

Enclosure

Appendix K: Confidentiality Agreement

Pledge of Confidentiality

As an individual who will be verifying the researcher's data entry, I understand that I will have access to participant scores and identification numbers. This information has been provided by research participants who participated in this project on good faith that their answers and identities would remain strictly confidential. I understand that I have a responsibility to honor this confidentiality agreement. I hereby agree not to share any of this information with anyone except the primary researcher of this project, his/her doctoral chair, or other members of this research team. Any violation of this agreement would constitute a serious breach of ethical standards, and I pledge not to do so.

Data Entry Validator

Date

VITA

Jessica Naber was born in Union City, Tennessee, to James and Christa Cherry. She is the youngest of three daughters, and she attended Carlisle County Elementary, Middle, and High Schools in Bardwell, Kentucky. She graduated cum laude with an Honors Diploma from Murray State University in 2002 with a Bachelor of Science degree in Nursing. In 2006, she received a Master of Science degree in Nursing Education. She is a candidate for the Doctor of Philosophy in Nursing degree from the University of Tennessee, Knoxville, and is scheduled to graduate in August 2011. Her major concentration of study is Nursing Education. She is married and has three children: two girls and a boy.

Mrs. Naber is a member of the Delta Epsilon and Gamma Chi Chapters of Sigma Theta Tau International. She has been employed as a critical care nurse in post-operative cardiac, a charge nurse in angioplasty and critical care, and a home health care manager. She currently teaches undergraduate nursing fundamentals, concepts, and research courses and a graduate nursing issues course at Murray State University's School of Nursing.