

A COMPARATIVE STUDY OF CRITICAL THINKING ABILITIES
OF SOPHOMORE AND SENIOR NURSING STUDENTS

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Chapter 1

Introduction

Introduction

The new millennium has brought a multitude of changes to the health care environment. Technological advances are rapid, financial conditions are unstable, and the health care demands of an aging population are mounting. Patient care for people with acute and chronic illnesses is complex. Nurses must make multiple clinical judgments daily in high stakes situations. A nationwide shortage of nurses and nursing faculty adds to the intense strain that nurses frequently report. The demand on health care providers is great, as nurses must reason well, demonstrate astute clinical judgment and be highly efficient and productive with limited resources.

Critical thinking skills are required for effective nursing practice and optimal outcomes for patients and health care systems. Critical thinking skills include the ability to gather and evaluate evidence and the ability to make informed judgments and decisions. Critical thinking, therefore, is a fundamental skill that nurses begin to learn during nursing education programs and continue to refine as they enter practice (Staib, 2003).

For nursing education programs, critical thinking is an expected outcome for nursing students, as required by accrediting agencies. Most educational institutions incorporate critical thinking into every level of the curricula (Spelic, Parsons, Hercinger,

Andrews, Parks & Norris, 2001). The National League for Nursing Accrediting Commission (NLN-AC) has developed criteria for critical thinking skills to be included in each school of nursing's outcomes. For example, nursing school programs are required to include a written plan for incorporating critical thinking skills and for the evaluation of critical thinking outcomes of the program. The plan must include definitions of critical thinking, definitions of levels of achievement, and tools or methods to assess critical thinking (NLN-AC, 1997).

One common outcome measure of critical thinking in undergraduate nursing students is passage of the national nursing licensure exam, the NCLEX-RN. The NCLEX-RN is thought to evaluate the nursing students' comprehension, application and analysis skills (Staib, 2003) and thus NCLEX-RN is considered an indirect measurement of a nurse's critical thinking skills. Giddens and Gloeckner (2005) investigated the relationship of scores on the NCLEX-RN with critical thinking skills of the nurses. Glidden and Gloeckner (2005) found that students who had passed the NCLEX-RN had higher scores documented on a frequently used measure of critical thinking, the California Critical Thinking Skills Test (CCTST) (Facione & Facione, 1992).

Nursing experts continue to disagree on the definition of critical thinking. Stewart and Dempsey (2005) defined critical thinking skills as analysis, evaluation, inference and deductive/ inductive reasoning. In Spelic et al.'s (2001) study, critical thinking was defined as the process of purposeful, self regulatory judgment that includes cognitive skills. These cognitive skills included interpretation, analysis, evaluation, inference, explanation and self-regulation. Facione and Facione (1991) identified critical thinking skills as the ability to concisely analyze, interpret, self-regulate, infer, explain and evaluate.

There also has been disagreement as to how critical thinking should be measured. Several tests intended to measure critical thinking have not been found to be valid for the discipline of nursing, specifically the Watson Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980a). Adams, Stover, and Whitlow (1999) chose to research critical thinking with the WGCTA and found it to be inappropriate for use in nursing education. Recently, there has been growing agreement that critical thinking can be conceptualized and measured as critical thinking skills and critical thinking dispositions. According to Facione (1992), critical thinking skills included analysis, interpretation, self-regulation, inference, explanation and evaluation. Critical thinking dispositions included truth seeking, open mindedness, analyticity, systematic, self confidence, inquisitiveness and cognitive maturity. The California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI) are two standardized tests developed by Facione and Facione (1991) to measure critical thinking skills and dispositions (McCarthy, Schuster, Zehr & McDougal, 1999).

Several research studies have been done to measure critical thinking in nursing students. Stone, Davidson, Evans, and Hansen (2001) completed a study that examined the validity of critical thinking tests that measured nurses' critical thinking abilities. Stone et al. found that critical thinking skills were essential to nursing practice but concluded that empirical evidence did not support using standardized test scores to measure nurses' critical thinking skills. Stewart and Dempsey (2005) developed a longitudinal study to review the development of critical thinking across curricular levels of a nursing program. The researcher found there to be no significant difference in critical thinking skills from the sophomore year to the senior year but did find a significant difference from the sophomore to

junior level. Adams, Stover, and Whitlow (1999) looked at nursing students during two different academic levels to assess if there was a difference in critical thinking skills. Adams et al. found that there was no increase in critical thinking skills of the nursing students as they progressed through the curricula. In a contradictory finding, Baker's (2002) results revealed that there was an increase in the scores on the CCTST and all subtests for both groups over the course of a curriculum. The data also showed a statistically significant difference in two of the subscale scores, specifically evaluation and deductive reasoning.

More research is needed on how critical thinking skills and dispositions actually develop across levels in nursing curricula. The purpose of this study is to examine the difference in critical thinking skills and critical thinking dispositions between sophomore nursing students and senior nursing students. This study also aims to determine if there is a relationship between critical thinking skills and critical thinking dispositions as nursing students' progress through their education.

Background and Significance

Critical thinking is a concept that arose from the field of psychology and entered the discipline of nursing in the late 1970's. The American College of Nursing emphasized the importance of critical thinking in nursing education, which was one of the first nursing organizations to take this stand. This emphasis on critical thinking expanded in 1992 as the National League of Nursing (NLN) required nursing schools to include critical thinking as one of the outcome criteria of the baccalaureate nursing degree. This criterion required satisfactory documentation of activity among the nursing schools to define and measure critical thinking.

The Watson Glaser Critical Thinking Appraisal (Watson & Glaser, 1980b) was one of the first instruments for measuring critical thinking in nursing. However, after much testing, researchers concluded that WGCTA was not sensitive enough to measure the changes in critical thinking of nursing students over time (Spelic et al., 2001).

The concepts of critical thinking skills and critical thinking dispositions first emerged in the early twenty-first century. Facione and Facione (1992) were the first leaders to identify and define critical thinking skills and critical thinking dispositions. According to Facione (1992), critical thinking skills included analysis, interpretation, self-regulation, inference, explanation and evaluation. Sub-skills included decoding, categorization, clarifying, examining, drawing conclusions, self examination, and self correction.

Dispositions included truth seeking, open mindedness, analyticity, systematic, self confidence, inquisitiveness and cognitive maturity. The California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI) are two standardized tests developed by Facione (1992) to measure critical thinking skills and dispositions (McCarthy, Schuster, Zehr & McDougal, 1999).

Little research has examined the progressive development of critical thinking skills and dispositions over the course of nursing curricula. Further study about nursing students' skills at various curricular levels is needed to guide nurse educators in teaching and measuring critical thinking. This study will look at the differences in scores on the CCTST and the CCTDI between second year nursing students and senior year nursing students.

Problem Statement

Critical thinking is a fundamental skill for all nurses in today's health care environment. Nursing programs aim to develop critical thinking abilities in nursing students. However, nurse educators do not have evidence about how critical thinking develops at various levels of nursing curricula. Research has not yet clarified the pattern of development of critical thinking skills and dispositions in nursing students across curricular levels.

Purpose of Study

The overall purpose of this study is to examine the difference in critical thinking skills and critical thinking dispositions between sophomore nursing students and senior nursing students. It is a partial replication of Profetto-McGrath's (2002) study, which was designed to investigate critical thinking skills in baccalaureate nursing students.

Research Questions

The following research questions guide this study:

1. What critical thinking skills (CTS) and critical thinking dispositions (CTD) do nursing students possess during the last semester of a baccalaureate curriculum?
2. Do scores on the CCTST and the CCTDI differ between a sample of nursing students in the second year of a baccalaureate nursing curriculum and a sample of nursing students in the final year of a baccalaureate nursing program?
3. Is there a relationship between nursing students' CCTST and CCTDI scores?

(Profetto-McGrath, 2002).

Conceptual Framework

There are limited theories that have been proposed to explain or predict critical thinking in the discipline of nursing. The conceptual framework that guides the present study

includes the concepts of critical thinking skills and critical thinking dispositions. The sub-concepts of this framework include the cognitive skills of analysis, interpretation, comprehension, evaluation, explanation and inference. This framework also includes the personal dispositions of maturity, self -confidence, open mindedness, truth seeking, analyticity, systematic view, and inquisitiveness. The conceptual framework for this study is grounded in the theoretical work of Miller and Babcock (1996). Miller and Babcock presented the Critical Thinking Interaction Model, which “conceptualizes the application of critical thinking and the attitude of practice” (Miller & Babcock, 1996, p. 10). According to Miller and Babcock, the way in which nurses solve problems and make decisions is derived from their assumptions, knowledge, and experience and requires an inquisitive spirit and open-mindedness toward divergent perspectives. The four components of this model that reflect critical thinking include focusing, language, evidence, and reasoning. These elements are identified when an individual interacts with another individual in the spoken word or in writing. This model can be applied to nursing education as the students and instructor enter into the clinical setting linking classroom lecture with clinical settings.

Definition of Study Variables

Critical Thinking Skills.

Conceptual Definition: The purposeful, self regulatory judgment which results in interpretation, analysis, evaluation, and inference (Facione, 1990).

Operational Definition: Total and subscale scores on the California Critical Thinking Skills Test (Facione, 1990). Included in critical thinking are the following skills:

1. Interpretation: express meaning or significance of a wide variety of experiences (Facione, 1990).

2. Comprehend: use judgment, beliefs, conventions, beliefs, rules and procedures (Facione, 1990).
3. Analysis: identify a relationship between statements, questions, concepts and other forms of representations intended to express beliefs or opinions (Facione, 1990).
4. Evaluation: assess the logical strengths of the relationships among the statements, descriptions or other forms of representations (Facione, 1990).
5. Inference: consider relevant information to draw reasonable conclusions related to information gathered (Facione, 1990).
6. Explanation: present one's results based on information gathered, identified and reviewed (Facione, 1990).

Critical Thinking Dispositions.

Conceptual Definition: A consistent internal motivation to engage in problems and make decisions by thinking (Profetto-McGrath, 2002).

Operational Definition: Total and subscale scores on the California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1994a; Facione & Facione, 1994b).

Included subscales under dispositions include:

1. Truth seeking: Courageous desire for the best knowledge (Facione & Facione, 1994 a & b).
2. Inquisitiveness: Curious and eager to acquire knowledge (Facione & Facione, 1994 a & b).
3. Analyticity: Demanding the application of reason and evidence (Facione & Facione, 1994 a & b).

4. Open mindedness: Tolerance of divergent views and willingness to seriously entertain alternatives (Facione & Facione, 1994 a & b).
5. Systematic: Valuing organization, focus, and diligence to approach problems at levels of complexity (Facione & Facione, 1994 a & b).
6. Self Confidence: Trusting one's own reasoning skills and inclined to use these skills (Facione & Facione, 1994 a & b).
7. Maturity: Prudence in making, suspending and revising judgment (Facione & Facione, 1994 a & b).

Limitations

This study was limited by the fact that the sample was from a single nursing program with a limited number of students. Students completed the study instrumentation at different times and in different places. Students may not have been highly engaged in scoring well on the tools since the scores did not impact their coursework.

Assumptions

The first assumption of this study is that the CCTST and the CCDTI are valid and reliable measures of critical thinking skills and critical thinking dispositions in nursing students. The second assumption is that all participants will respond honestly to the items on the tools.

Summary

The new millennium has brought a multitude of changes to the health care environment. Critical thinking is a fundamental skill for nurses and is an expected outcome for nursing students who complete a nursing educational program. Research has not yet clearly demonstrated how critical thinking skills and dispositions vary across curricular

levels. The purpose of this study is to add to what is known about critical thinking among nursing students by exploring differences in critical thinking skills and critical thinking dispositions between sophomore nursing students and a senior-year nursing students.

Chapter II

Review of Literature

Introduction

Critical thinking is a fundamental skill for nurses to function in a complex health care system. Nurses in all areas of the discipline must utilize critical thinking skills to care for patients, teach students, and conduct research. Therefore, nursing schools teach critical thinking skills and require students to demonstrate an ability to think critically about complex data. The National League for Nursing Accrediting Commission (NLN-AC) requires nursing programs to provide a definition of critical thinking, how it will be measured, and what outcome data will be collected to evaluate critical thinking (NLN-AC, 1997).

Research has not yet clarified how critical thinking skills and dispositions vary across curricular levels. An understanding of the evolution of critical thinking across curricular levels could assist nurse educators in supporting and evaluating critical thinking skills and dispositions. The overall purpose of this study is to add to what is known about critical thinking among nursing students by exploring differences in critical thinking skills and critical thinking dispositions between sophomore nursing students and a senior-year nursing students. The literature review on this topic will be divided into three sections, specifically critical thinking in nursing students, critical thinking and nursing faculty, and critical thinking as a measure of curricular outcomes.

Conceptual Framework

There are limited theories that have been proposed to explain or predict critical thinking in the discipline of nursing. The conceptual framework that guides the present study includes the concepts of critical thinking skills and critical thinking dispositions. The subconcepts of this framework include the cognitive skills of analysis, interpretation, comprehension, evaluation, explanation and inference. This framework will also include the personal dispositions of maturity, self-confidence, open mindedness, truth seeking, analyticity, systematic view, and inquisitiveness. The concepts of this study are grounded in the theoretical work of Miller and Babcock (1996). Miller and Babcock presented the Critical Thinking Interaction Model, which “conceptualizes the application of critical thinking and the attitude of practice” (Miller & Babcock, 1996, p.10). According to Miller and Babcock, the way in which nurses solve problems and make decisions is derived from their assumptions, knowledge, and experience and requires an inquisitive spirit and open-mindedness toward divergent perspectives. The four components of this model that reflect critical thinking include focusing, language, evidence, and reasoning. These elements are identified when an individual interacts with another individual. This model can be applied to nursing education as the students and instructor enter into the clinical setting, linking classroom lecture with clinical settings.

Critical Thinking in Nursing Students

An accrediting agency, National League for Nursing Accreditation Council (NLN-AC), sets criteria for critical thinking skills that nursing programs must meet in preparing graduates in nursing. The faculty is responsible for teaching and evaluating critical thinking. Little is known about how critical thinking is developed across curricular levels. Stewart and

Dempsey (2005) conducted a longitudinal study to examine nursing students' knowledge of critical thinking as students progress through the educational process. The research questions addressed in the study were:

1. Is there a significant change in the critical thinking dispositions of baccalaureate nursing students as they progress from the sophomore level to the senior level?
2. Are there significant correlations between critical thinking dispositions, shown on the Educational Resources Inc (ERI) RN Assessment scores (NLN, 1997) and GPA?
3. Is there a difference in critical thinking dispositions between students who passed the NCLEX-RN and those who did not? (Stewart & Dempsey, 2005)

The study was conducted at a baccalaureate nursing program in the Midwest. Both the California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1994a) and the Educational Resources, Inc. (ERI) RN Assessment (NLN, 1997) were given to the students during their sophomore and senior years of the nursing program. The students were tested at the tenth week of the semester during their sophomore, junior and senior years. The students' results were divided as sophomore, junior and senior. Junior and seniors were then divided into two groups based on the semester in which they were tested. A total of 164 students participated in this study, specifically 55 sophomores, 49 juniors and 34 seniors. At the beginning of the study, the mean GPA was 3.0, and the mean age of participants was 22.96 years (Stewart & Dempsey, 2005).

Stewart and Dempsey (2005) completed a one-way analysis of variance (ANOVA) to compare CCTDI subscale scores and total scores, in order to answer the first research question, addressing if there was a difference in critical thinking dispositions as the students progressed through the educational process. The results showed there was a significant

difference among the scores on the total CCTDI and on all subscales, except truth seeking and maturity (Total CCTDI: $F=35.55$, $p=.000$; Open-mindedness: $F=27.68$, $p=.000$; Analyticity: $F=37.47$, $p=.000$; Self-confidence: $F=7.13$, $p=.000$; Inquisitiveness: $F=38.8$, $p=.000$). A follow-up post-hoc Turkey's HSD also revealed a significant difference between the sophomore, junior and seniors in the total CCTDI scores and the five CCTDI subscale scores, including open-mindedness, analyticity, systematically, self confidence, and inquisitiveness. Truth seeking and maturity did not present a significant difference during the data collection time periods within the nursing curriculum. The CCTDI were the highest during the junior year but not significantly different among the junior I and junior II level (Stewart & Dempsey, 2005).

The second research question addressed the relationship between GPA and the ERI scores. There was a positive correlation between the GPA and the open mindedness subscale in the sophomore ($r=.28$, $p=.045$) and the Junior II scores ($r=.39$, $p=.001$). At the Junior I level, there was a positive correlation between the GPA and the maturity subscale score and the total CCTDI score ($r=.30$, $p=.040$). Among seniors, confidence subscale scores were negatively correlated with the GPA ($r= -.51$, $p=.001$). The only critical thinking subscore that showed a positive correlation with the GPA was inferential reasoning ($p=.001$) (Stewart & Dempsey, 2005).

The third research question noted a significant difference between the critical thinking dispositions of students who passed the NCLEX-RN and students who did not (Stewart & Dempsey, 2005). Stewart and Dempsey concluded there was no difference in critical thinking skills at the sophomore level as compared to the senior level. The highest critical thinking scores noted were in the Junior I and Junior II levels.

The study was limited by the small sample size and the attrition between the sophomore and senior levels. It should be noted that the researchers believed that placing the CCTDI at the end of the senior clinical internship rather than prior to it would affect the results in a positive manner (Stewart & Dempsey, 2005).

Stewart and Dempsey (2005) recommended that more studies be done using a discipline-specific outcome tool. These tools should be developed specifically for addressing critical thinking abilities and dispositions in nursing. It was also noted that nursing schools were encouraged to produce outcome data regarding critical thinking. A longitudinal study could be conducted from entry level to a nursing program to 5 year post and 10 years post graduation (Stewart & Dempsey).

Similarly, Giddens and Gloeckner (2005) believed that students should be taught critical thinking skills and students' ability to critically think may be correlated with the NCLEX-RN exam scores. The purpose of the study by Giddens and Gloeckner was to investigate the relationship of students' critical thinking skills and performance on the NCLEX-RN. The sample included 218 nursing students who had completed a baccalaureate nursing program from 1998-2001. Of the 218 participants, 22 were male, and 196 were female. The mean age was 30 years. They had similar results for critical thinking skills in comparison to the national population of nursing graduates. There were differences in ethnic distribution, critical thinking dispositions and the NCLEX-RN pass rate between the study sample and the national population (Giddens & Gloeckner). National standard for pass rate on the NCLEX-RN was 85% and 93% for the sample (Giddens & Gloeckner).

The students completed the California Critical Thinking Disposition Inventory (CCTDI) and the California Critical Thinking Skills Test (CCTST) on entry and exit level of

the curriculum. Students also took the National Council Licensure Examination for Registered Nurses (NCLEX-RN) with results on file at the school between 1998-2001. The CCTST measured critical thinking using a discipline-neutral instrument that gave six scores, including a total score and five sub-scores. The CCTDI consisted of 75 statements with a six-point Likert response scale. Responses ranged from strongly agree to strongly disagree. The CCTST and the CCTDI were given to students at the beginning of the nursing program and then during the last semester of the program. The NCLEX-RN and the GPA were matched with the CCTDI and the CCTST results. Age and gender data were extracted by the university, coded to eliminate identifiers, and then forwarded to the researcher (Giddens & Gloeckner, 2005).

The authors reviewed the data for influences due to age, gender and GPA to identify if there was a difference between pass/fail groups compared to other reported research (Gibbons & Gloeckner, 2005). There were found to be no significant difference in NCLEX scores associated with age and gender. The authors then compared the GPA with the results from the NCLEX-RN. A t-test was performed for confirmation of the results. The t-test showed there was a significant difference in NCLEX scores associated with the students' GPA's ($t[209]=5.3$, $p < .001$, $d=1.38$) (Giddens & Gloeckner, 2005).

In a further examination of differences between critical thinking skills, disposition scores and NCLEX-RN pass-fail results, a t-test was performed to compare the means of the two groups on the CCTST. There was a statistically significant difference when comparing the mean scores in students who passed and students who failed NCLEX: (a) total scores: [$t(101)=2.5$, $p=0.15$, $d=1.0$]; (b) analysis [$t(101)=2.4$, $p=.017$, $d=1.1$]; and (c) deductive reasoning [$t(101)=3.0$, $p=.003$, $d=1.2$] (Giddens & Gloeckner, 2005). The data showed that

students who passed the NCLEX-RN had significantly better critical thinking skills than the students who did not pass the exam.

In the CCTST post scores, the pass group had statistically higher mean scores on all six scores, with a medium to large effect. These findings are represented by the following data: total CCTST score: $t(183)=2.6$, $p=.010$, $d=.72$; analysis: $t(191)=2.2$, $p=.0026$, $d=.60$; evaluation: $t(101)=2.2$, $p=.030$, $d=.59$; inference: $t(101)=2.6$, $p=.001$, $d=.69$; inductive reasoning: $t(191)=2.7$, $p=.008$, $d=.72$; and deductive reasoning: $t(191)=2.1$, $p=.008$, $d=.72$ (Giddens & Gloeckner, 2005).

When the author compared the mean scores for the CCTDI between students who passed NCLEX and those who did not, the NCLEX-RN pass group exceeded those of the failed group on critical thinking disposition scores, with a medium to large effect on five of the eight subscores, as follows: total CCTDI score: $t(183)=2.6$, $p=.010$, $d=.72$; truth-seeking: $t(183)=2.7$, $p=.007$, $d=.75$; open mindedness: $t(183)=2.4$, $p=.015$, $d=.64$; and synthesis: $t(183)=2.2$, $p=.030$, $d=.60$. The author used a t-test to compare the failed group results to the national mean scores. The authors found there to be no statistically significant difference between the two groups (Giddens & Gloeckner, 2005).

Having the availability of entry and exit data allowed the researchers to study changes in critical thinking over time. In comparing the pass/fail groups on critical thinking skills and dispositions over a period of time, the researchers identified there was a significant change only on confidence subscale of the CCTDI [$t(84)=3.5$, $p=.001$, $d=.3$] and deductive reasoning subscale of the CCTST [$t(84)=2.4$, $p=.02$, $d=.26$]. The researchers also assessed whether the CCTST or the CCTDI scores could be a predictor for pass/fail of NCLEX-RN pass or fail. The CCTST and the CCTDI did predict passing of the NCLEX-RN but were

unreliable for predicting those who were likely to fail the NCLEX-RN (Giddens & Gloeckner, 2005).

Researchers found that participants who passed the NCLRX-RN had higher scores on the CCTST than students who failed the NCLEX-RN. This difference was demonstrated on both entry and exit results but were more pronounced in the exit scores. Giddens and Gloeckner (2005) supported the thought that critical thinking ability was a predictor of NCLEX-RN success. A limitation of this study was the lack of representativeness of the sample of nursing students' related to geographic location.

McCarthy, Schuster, Zehr, and McDougal (1999) also explored critical thinking skills and dispositions in nursing students. The authors compared critical thinking scores of sophomore and seniors to determine if there was a difference in critical thinking skills and dispositions across curricular levels. Research questions that McCarthy et al. (1999) addressed were:

1. Are there differences between sophomore and senior students on total scores of the CCTST and the subscales of the CCTST?
2. Are there differences between sophomore and senior students on total scores of the CCTDI and the subscales of the CCTDI?
3. Is there a relationship between the scores on the CCTST and the CCTDI?
(McCarthy et al., 1999).

The setting was a 4-year nursing program in urban northeastern Ohio. The school had a well-established nursing program. The program had a 94% NCLEX passing rate. The student to instructor ratio was 8 to 1. A sample of 241 nursing students was used, with 156

being sophomores and 85 being seniors. The mean age for the sophomores was 24 years and for the senior was 26 years. The GPA for the nursing students was 3.03 for sophomores and 3.02 for seniors (McCarthy et al., 1999).

The first instrument McCarthy et al. (1999) used was the CCTST. Subscales were analysis, inference, evaluation, interruption and explanation. The CCTST was a 34-item multiple choice instrument. There were two forms of this test, form A and form B. The researcher used form A. The second instrument McCarthy et al. used was the CCTDI. The authors of this test defined critical thinking dispositions as attitudes, intelligent virtues and habits of the mind. This instrument was set up to measure seven subscales of critical thinking dispositions: truth seeking, open mindedness, analyticity, systematicity, self confidence, inquisitiveness, and cognitive maturity (McCarthy et al.). This instrument was a 75-item using Likert response, ranging from strongly agree to strongly disagree. The seven subscales had between 9-12 questions each (McCarthy et al.).

Research question one addressed the difference between sophomores' and seniors' total scores on the CCTST. McCarthy et al. (1999) found there was a significant difference in scores between the sophomores and seniors. The mean score for sophomores was 15.36 ($SD \pm 3.65$) and seniors was 17.26 ($SD \pm 3.36$). An independent t-test revealed that seniors scored significantly higher in the critical thinking skills [$t(237) = 4.1, p < .001$].

The second research question addressed the differences in total scores on the CCTDI between sophomore and senior nursing students. The results showed significant differences between the scores of the sophomore and seniors. The sophomore mean was 315.48 ($SD \pm 31.07$) and the senior mean was 325.94 ($SD \pm 31.14$). An additional independent t-test

was done and revealed that seniors scored significantly higher in critical thinking than sophomores [$t(239) = 2.5, p < .001$] (McCarthy et al., 1999).

For the final research question, the researcher addressed the correlation between the CCTST and the CCTDI using a Pearson r correlation. The results indicated a significant correlation between the CCTST and the CCTDI total scores ($r = .24, p < .001$) (McCarthy et al., 1999).

The authors concluded that nursing students gain critical thinking skills and dispositions across the curricular levels. Findings showed a significant difference in critical thinking skills and dispositions between sophomore and seniors in this sample. More research is needed on the relationship between critical thinking skills and persons' dispositions (McCarthy et al., 1999).

Shin, Jung, Shin and Soo Kim (2006) looked at various nursing programs to identify if there was a difference in the critical thinking skills related to their nursing programs. They wanted to see if there was a difference in the level of critical thinking related to the type of nursing program the nurses attended (Shin et al.). The three different programs included a 3-year Associate degree program (ADN), 4-year baccalaureate program (BSN), and 5-year RN-to-BSN program.

Shin et al. (2006) used the CCTST and the CCTDI to evaluate nursing students in three different programs. The research questions addressed were:

1. What scores do the senior students enrolled in South Korean ADN, BSN, and RN-to-BSN programs achieve on the CCTST and the CCTDI (Shin et al., 2006)?
2. Are there significant difference in CCTST and the CCTDI scores among senior students in ADN, BSN and RN-to-BSN programs (Shin et al., 2006)?

3. Is there a correlation between the CCTDI and CCTST scores of senior students enrolled in South Korean ADN, BSN, and RN-to-BSN programs (Shin et al, 2006, p. 234)?

Shin et al. (2006) used a non-experimental design using only senior students enrolled in ADN, BSN, and RN-to-BSN programs. The researcher collected the data from September to November, 2000. The students were selected through a convenience sampling plan.

Shin et al. (2006) used the CCTDI and the CCTST after both were translated into Korean and back to English to ensure accuracy. The researcher used the CCTDI that was developed by Facione and Facione (1994b). The CCTDI had 75-items and was broken down into seven scales and five subscales using the Likert scoring ranging from strongly agree to strongly disagree. The seven scales included truth seeking, open-mindedness, analyticity, systematic, critical thinking self-confidence, inquisitiveness and maturity of judgment (Shin et al., 2006). The total score was 420 with <280 reflective of weakness in critical thinking and a score of >350 indicating a strength in critical thinking (Shin et al). The Cronbach's alpha coefficient of the total CCTDI scale was reported to be 0.90 by Facione (1994). In this study, the Cronbach's alpha coefficient was 0.7847 (Shin et al.).

The second critical thinking test was the CCTST, which consisted of 34-items, each with four options. The test required 45 minutes to complete. The scores ranged from 0 to 34; higher scores were considered reflective of stronger critical thinking. The test norm ranges were established from 2 to 29 with a standard deviation of 4.46. The mean was 15.89, identifying anything less than 15.89 to be weak in critical thinking; greater than 15.89 indicated strength in critical thinking (Shin et al., 2006). Shin et al. used the Kuder-Richardson internal reliability coefficient to support reliability. Reliability was reported as

0.68-0.70 (Shin et al.). The researchers used form A of the CCTST. In comparing scores of the CCTST and the CCTDI, Shin and colleagues used a Pearson r correlation.

In addressing the first research question, results indicated that all nurses taking the CCTDI and the CCTST scored below the average mean. The mean for the CCTDI score for all students was 263 of 420, indicating a weakness in critical thinking dispositions (Shin et al., 2006). When breaking down the subscale scores, the students scored 44.64 for inquisitiveness, 40.89 for critical thinking self confidence, 40.42 for analyticity, 36.91 for open-mindedness, 35.70 for systematicity, 34.43 for maturity of judgment and 30.12 for truth seeking (Shin et al.). Scores on four out of the seven subscales fell below the standard score of 40, thus revealing a weakness in critical thinking. The CCTST results had a mean of 15.89; the nursing students results were 11.36, revealing a weakness in critical thinking (Shin et al., 2006)

The researcher then addressed differences among the different programs. When comparing the different programs, the scores from the CCTDI revealed that the BSN students' scores were statistically significantly higher as compared to the RN-to-BSN and ADN programs. Means scores were: BSN students, $x = 267.40$; RN-to-BSN students, $x = 261.15$; and ADN students, $x = 261.50$ [$F = 4.159$, $p = 0.017$] (Shin et al., 2006). This variation may be related to teaching methods used during the curriculum or the educational institutions (Shin et al., 2006). When reviewing the subscale scores, the BSN students' scores were significantly higher on truth seeking ($p = 0.003$), open-mindedness ($p = 0.038$), critical thinking self confidence ($p = 0.016$), and maturity of judgment ($p = 0.000$) (Shin et al., 2006). The CCTST scores for the BSN and RN-to-BSN program were statistically significant higher in comparison to the scores of the ADN programs ($F = 24.205$, $p < 0.0001$)

(Shin et al., 2006). The scores for every scale showed statistically significant differences, with the BSN being the highest followed by the RN-to-BSN and then the ADN.

The third research question addressed the correlation between the CCTDI and the CCTST. Using the Pearson r , the critical thinking dispositions and the skills of the nursing students ($n=305$) showed a statistically significant positive correlation ($r=0.305$, $p=0.000$) (Shin et al., 2006).

The results of this study showed that the CCTDI scores for the senior students fell short of the established mean of 280 set by Facione and Facione (1994b). Shin et al. (2006) felt this could be result of the authoritarian educational system in South Korea that may have limited students' abilities to learn to think in ways measured by this instrument.

Shin et al. (2006) demonstrated that the types of nursing programs can have an effect on critical thinking abilities. Shin et al. also supported that critical thinking strategies need to be developed in nursing programs and that culture may have an effect on the teaching and developing of critical thinking skills.

Another study that looked at critical thinking skills and critical thinking dispositions was completed by Profetto-McGrath in 2002. Profetto-McGrath developed a non-experimental study to examine the critical thinking skills (CTS) and the critical thinking dispositions (CTD) of students in a 4-year baccalaureate program. The author believed this study could help nurse educators in the development of students' critical thinking skills.

Profetto-McGrath (2002) described critical thinking as a significant component of nursing education claiming that nurses in today's work force need to be able to think fast and process much information in a shorter time period. In evaluating this component of nursing, Profetto-McGrath developed a study to evaluate students' abilities to critical

think using a non-experimental, cross sectional design. The study examined data from four cohorts of students enrolled in a BSN program. This study also reviewed the relationship between critical thinking skills (CTS) and critical thinking dispositions (CTD). The following questions guided the study:

1. What are the CTS and CTD scores of the baccalaureate nursing students?
2. Do baccalaureate nursing students' CTS and CTD scores differ according to the number of years in the program?
3. Is there a relationship between baccalaureate nursing students CTS and CTD scores? (Profetto-McGrath, 2002).

This sample consisted of 229 full time students enrolled in a four year BSN program. The students were given 75 minutes to complete the questionnaire. The two tools that Profetto-McGrath (2002) used were CCTST and the CCTDI. The author also collected information regarding background/demographic information from the students.

Profetto-McGrath (2002) also administered a biographical questionnaire. On this questionnaire, the author asked the students if they had any previous college experience and what their opinions were of critical thinking. Results were varied regarding previous college experience. Forty-five percent had only high school experience; twenty-nine percent had completed university level; and twenty-six percent had completed some college.

The scores were transferred to the SP Version 6.1 for Windows. Profetto-McGrath (2002) found support for the reliability of the CTS using the Kuder Richardson 20 and the Cronbach alpha. The author used both descriptive and inferential statistics to analyze the data. The descriptive statistics included calculation of the mean, standard deviation, modes, minimum and maximum scores, percentages, and confidence intervals. The inferential

statistics included the chi-square test and the ANOVA. The inferential statistics were used to test the difference between the students at the different levels of education. The chi-square statistic was used to evaluate if there was an association between scores on the CCTST and the CCTDI.

Nearly 80% of respondents thought that critical thinking was important to nursing and being logical was extremely important or most important aspect of critical thinking. None of the respondents thought critical thinking was a waste of time (Profetto-McGrath, 2002).

When the author reviewed the results from the CCTST, they found no statistically significant differences across curricular levels. The researcher found the mean score for all four years ranging from 16.7-17.9, with a mean score of 17.4, out of maximum of 34. The researcher found that the mean score did increase from year to year with the exception of the third year, but there were no statistically significant differences across years (Profetto-McGrath, 2002). Facione and Facione (1994a) reported that the scores under 10 or greater than 20 were rare for nursing students. Profetto-McGrath found that only six (2.6%) of their students' scored less than 10, and eighty-seven (38.1%) of the students actually scored greater than 10. These results indicated that the students had an adequate level of critical thinking.

Profetto-McGrath (2002) reported the scores for the CCTDI ranged from 136 to 392. They did report that four (1.8%) of the students scored less than 280, while twenty-nine (12.7%) students score greater than 350. When reviewing the fourth year group, four students scored more than 350. Even with these scores, there was still no statistically significant difference in the CTD score across the four years of the program.

The author also analyzed the CCTDI subscale score means, as follows: truth seeking: $x=37.6$; open-mindedness: $x = 46.5$; analyticity: $x = 45.8$; systematicity: $x = 42.4$; confidence: $x = 44.7$; inquisitiveness: $x = 48.9$; and maturity: $x= 46.1$ (Profetto-McGrath, 2002). Scores on truth-seeking were the lowest of all subscales of the CCTDI. Facione and Facione (1994b) defined truth seeking as intellectual honesty, courage to require the best knowledge, inclination to ask challenging questions and the willingness to pursue evidence and proof regardless of the results (Profetto-McGrath). The students scored the highest on the inquisitiveness and open-mindedness subscales. The only subscale that showed a statistically significant difference across the groups was the systematic subscale ($F=3.582$, $P=0.015$) (Profetto-McGrath). This subscale represented organized, orderly, focused and diligent behavior.

Profetto-McGrath (2002) reviewed the relationship between CCTST and CCTDI scores. The author found that there was a significant relationship between CTS and the CTD scores of the students ($\chi^2 = 9.37$, $P=0.014$). The author found there was no statistical significant difference in the CCTST total score across the four years of the program. The results differed from McCarthy et al.'s (1999) study that showed there was significantly higher score in the fourth year student compared to the second year student. Profetto-McGrath felt that this lack of increase was due to the cognitive development of the students. It was believed that cognitive growth and development is associated with the ability to engage in critical thinking (Profetto-McGrath, 2002).

Profetto-McGrath (2002) did find 85% of the students achieved a CCTDT score of 280-350, indicating the presence of dispositions essential for the development of higher-order of critical thinking and learning. The highest mean score the students obtained was related to

inquisitiveness. This score was thought to reflect curiosity and eagerness to obtain knowledge. The author found this finding to be both exciting and of interest. It is thought that nursing is a discipline in which professionals need to be curious in nature and always seeking knowledge (Profetto-McGrath).

Profetto-McGrath (2002) found that students had adequate CTS and CTD scores and the two variables were correlated positively with each other. The results indicated that even with an adequate knowledge of CTS and CTD, the students needed to continue to develop these skills. The students' dispositions and habits were believed to be essential for the development of CTS.

Profetto-McGrath (2002) emphasized three approaches for instructors to aid in the continued development of CTS and CTD skills among students. First, the instructors must have knowledge of critical thinking skills and how to use them in the clinical settings. This first-hand knowledge was purported to help the instructor develop CTS in the classroom and clinical settings (Profetto-McGrath). Secondly, the instructors must review the curriculum framework, teaching strategies and course elements to ensure that the components are encouraging and not obstructing to the CTS and their ability to use them (Profetto-McGrath). The third strategy was that the nurse educator must use the variety of different strategies to develop CTS and to foster the use of CTS. These strategies can be anything from debates, case studies, reflective journals, role modeling, and research projects. These strategies can be aimed at facilitating CTS and assisting the students in using these skills (Profetto-McGrath).

In another test of the CCTST and the CCTDI, Stone, Davidson, Evans, and Hansen (2001) examined critical thinking in nursing students and included the perspective of nursing

faculty. Specifically, the key purposes of this study were to explore faculty perceptions of critical thinking and to evaluate the California Critical Thinking Skills Test (CCTST) and the California Critical Thinking Disposition Inventory (CCTDI) (Facione & Facione, 1994b).

The researchers explored critical thinking skills of nursing students in NLNAC accredited schools of nursing. Stone et al. (2001) sent surveys to the dean or program directors who forwarded them to faculty members who were responsible to integrate critical thinking into the curriculum. The faculty then administered the CCTST and the CCTDI to senior nursing students. The nursing students were enrolled from 1996-1999. The total sample size was 338 students. A total of 632 surveys were mailed with 338 surveys returned, for a 53% return (Stone et al).

The CCTST was a 34-item multiple choice questionnaire designed to assess critical thinking. The second instrument was the CCTDI, which was a 75-item Likert scale tool designed to measure seven different dispositions associated with critical thinking. Stone et al. (2001) developed a survey to further explore faculty perceptions of the skills and dispositions of the CCTST and the CCTDI. The survey had four parts for the participants to complete. The first section had a 4-point Likert scale. The respondents indicated the degree to which each of the skills listed was essential to the practice of nursing. On the second part of the tool, the respondents were asked to indicate the five most important skills and the five traits needed for practicing nursing. On the third section of the survey, the respondents were asked to think about ways in which critical thinking skills were measured and the degree to which these skills reflected critical thinking by nurses. The final portion of the survey collected information regarding demographics, including types of nursing program, beliefs

regarding evaluation of critical thinking skills, and the type of tests currently being used to evaluate critical thinking.

Findings indicated that the majority of the respondents thought that critical thinking skills were moderately integrated into the curriculum. It was also noted that the respondents overwhelmingly thought it was important to evaluate critical thinking skills of their students. The results found that the CCTST was the most commonly used method to measure critical thinking (Stone et al., 2001).

In the second portion of the survey, faculty respondents identified five of the most important critical thinking skills and the five traits most needed for critical thinking. Approximately half the respondents thought that the five most important skills were decoding, drawing conclusions, organizing information, examining ideas and assessing claim or judging the credibility of information. These skills dealt with assessing situations and problem solving. The results of responses regarding the five traits needed for critical thinking were ambiguous. The majority agreed on only three traits consistently, which included being well informed, concern and flexibility in considering alternatives or opinions (Stone et al., 2001).

The third portion of the survey dealt with ways to measure critical thinking. These items were constructed to reflect the type of skills represented by the three subscales of the CCTST. The results indicated that five of the seven items had a mean response of 2-3 (Stone et al., 2001). This finding indicated that the respondents believed that the items designed to reflect critical thinking skills were not actually reflective of critical thinking skills relevant to nursing. The remaining two items which received responses greater than three were from a psychosocial health focus (Stone et al., 2001).

The CCTST and the CCTDI scores were compared with verbal and math SAT scores. The CCTST total scores provided the highest correlations with the SAT test, rather than the GPA (Stone et al., 2001).

The authors concluded from the results of the study that both critical thinking skills and critical thinking dispositions were essential to the practice of nursing. Stone et al. (2001) also concluded that the empirical evidence did not support using scores from a general measure of critical thinking to evaluate nurses' critical thinking skills. Nursing programs may need to reexamine how critical thinking is evaluated (Stone et al).

Baker (2002) also examined critical thinking across curricular levels in a study based on the objectives of the National Education Goal Five from the United States Department of Education. Goal Five stated critical thinking abilities need to be addressed by all educators (Baker). The National League for Nursing has developed criteria for nursing schools to consistently evaluate their programs for critical thinking. Baker developed a longitudinal ex post facto study over a four-year period and included two separate classes of nursing students in this study to evaluate the program outcomes. Baker used the CCTST as the instrument of choice for the student to complete at the beginning of their sophomore year and the beginning of their senior year.

The CCTST consisted of 34-items, each with four options. The test required 45-minutes to complete. The scores ranged from 0 to 34, with higher scores reflective of stronger critical thinking (Baker, 2002).

The researchers administrated the CCTST to the second year nursing students between the years of 1996-1999; the second group attended the program between 1997-2000. Both of the groups were entering their sophomore year of nursing education at the time of

initial data collection. Both groups were again asked to complete the CCTST during the spring semester before graduation (Baker, 2002).

The results revealed that there was an increase in the scores of the CCTST and all subtests for both groups from time 1 to time 2 (Baker, 2002). The data also showed a statistically significant difference in two of the subscale scores: evaluation ($p=.003$) and deductive reasoning ($p=.008$). The data from the class of 1997-2000 also showed a statistically significant difference ($p=.001$) in scores on the CCTST. The data did not reveal any statistically significant differences in the subscales scores. Baker identified that further research is warranted related to the small sample size. The researcher identified implications for the nursing and educational practices based on these findings.

In another study of critical thinking among nursing students, Adams, Stover, and Whitlow (1999) developed a longitudinal approach that looked at critical thinking abilities among nursing students attending one baccalaureate nursing program. This longitudinal study used the Watson-Glaser Critical Thinking Appraisal (WGCTA) (Watson & Glaser, 1980b) to compare scores among the sophomore-level students and scores of the same students at the senior level. Adams and colleagues also analyzed ACT composite, gender, transfer status, and first-degree or second degree status for differences. The research question these authors developed was:

1. Is there a difference between the scores of the sophomore-level nursing students and the senior-level nursing students using the WGCTA? (Adams et al., 1999).

Adams et al. (1999) sampled 203 students from a state supported university in the southern eastern part of the US. The program was accredited by the National League of Nursing. The majority of the sample was made up of 185 females as compared to 18 males.

The range of the students' ages was 20 to 48 years, with the average age of the sophomore level being 23 years. The authors identified that the mean ACT composite was 21. Over fifty percent of the students began their college education in the BSN program (58.6%); 31% transferred from other two year programs, while 9.9% were from other 4 year institutions. The majority of students (96%) were receiving the baccalaureate degree as their first degree. The average GPA of this sample was 3.160.

The WGCTA instrument used in the study was an 80-item instrument. Two forms of this test were used for the pretest and posttest measurements. This instrument is composed of five subtests, which were based on the five abilities identified by Dressel and Mayhew (1954). The subscales included: inference, recognition of assumptions, deduction, interpretation and evaluation of arguments (Adams et al., 1999).

Inference was identified as the subject's ability to discriminate between true and false inferences drawn from given data. Recognition of assumptions was the second subtest, which identified the subject's ability to recognize the stated and unstated assumptions in various statements. The third subtest, deduction, measured the ability to decide if the conclusions logically follow various statements. Interpretation was the fourth subtest, which identified the student's ability to draw valid conclusion from the given data. The final subtest was the evaluation of argument. This subtest looked at the subjects' ability to distinguish between weak irrelevant arguments and strong relevant arguments (Adams et al., 1999). The maximum raw score on the WGCTA is 80, with each subtest having a maximum raw score of 16.

During the first clinical nursing course of the second semester of the sophomore year, the author explained the research endeavor, and the students were given the option of

participating in the study. The students who consented to participate were administered form A of the WGCTA. Once these students completed their preceptorship experience during the last semester of the senior year, the students were administered form B of the WGCTA. Additional information such as age, gender, transfer status, ACT composite score, first degree and second degree status and GPA were compiled on each student through the Office of Nursing Students Services. Participants in the sample were assigned a code number to track data.

The mean score for the WGCTA was 54 for both the sophomore and the senior level, with a standard deviation of 9.30 (sophomores) and 9.38 (seniors) (Adam et al, 1999). Cronbach's alpha was used to measure the internal consistency reliabilities for the overall WGCTA form A and form B. They were .6068 and .6987, respectively (Adams et al., 1999).

A paired t-test was used to determine if a difference existed between the WGCTA raw scores of the students, first at the sophomore and then again at the senior level. There was no statistically significant difference in the total WGCTA raw scores ($t=.954$, $p = .05$) (Adams et al., 1999). Each subtest was examined for differences using a sample t-test at both levels sophomore and senior. No statistical difference was found with the subtests of inference ($t=.573$, $p= .05$), recognition of assumptions ($t=.519$, $p= .05$), deduction ($t=.314$, $p= .05$), interpretation ($t=.122$, $p=. 05$), or evaluation of arguments ($t=.123$, $p=.05$) (Adams et al., 1999).

Using an independent t test, the variables of gender, transfer, and degree status were examined in relationship to the WGCTA raw scores and subtests. A statistically significant difference was found between genders and the evaluation of argument subtests during the sophomore year ($p=.05$). This significance may be questioned related to the female

dominated sample. There were also statistically significance differences between the transfer status and inference subscales at the sophomore level and the deduction subscales at the sophomore and senior levels ($p=.05$). Transfer status and the WGCTA raw scores at both levels showed a statistically significant difference with higher scores (Adams et al., 1999).

A Pearson r correlation was computed to determine if there was a relationship between the WGCTA scores and the ACT composite, GPA, and age. A moderate positive correlation was found with the ACT composite scores and the sophomore WGCTA raw scores ($r=.5257$, $p<.05$). The ACT subtests of interpretation ($r=.4292$, $p>.05$), inference ($r=.3787$, $p>.05$), deduction ($r=.3683$, $p>.05$) evaluation of arguments ($r=.2778$, $p>.05$) and assumptions ($r=.1589$, $p>.05$) also reflected a positive correlation (Adams et al., 1999). Average GPA positively correlated with sophomore WGCTA raw scores and each subtest. Senior level WGCTA raw scores yielded a low positive correlation with ACT ($r=.2642$, $p<.05$) and GPA ($r=.1537$, $p<.05$). There was also a low positive correlation between the senior subtest of deduction with ACT ($r=.3086$, $p<.05$) and interpretation with GPA ($r=.1726$, $p<.05$). There was no significant relationship between WGCTA scores and age (Adams et al., 1999).

Adams et al.'s (1999) study supported the findings of Sullivan (1987) and Bauwens and Gerhard (1987), that there was no increase in critical thinking abilities of baccalaureate nursing students between the sophomore and senior years. The results of this study suggested that the WGCTA may not be an accurate instrument of choice for studying critical thinking in the nursing students in this longitudinal study. Previous studies have cited a small sample size as a cause of insignificant results; however, this sample size of 203 is one of the largest published to date, suggesting that the instrument may not be validly measuring

critical thinking, the existence of a nonviable instrument. The author concluded that further investigation is needed into other quantitative critical thinking instruments focused on the discipline of nursing.

Critical Thinking and Nursing Faculty

The perspective of nursing faculty on critical thinking is important to determine, given that faculty hold responsibility to teach it during a nursing curriculum. Several studies on nursing faculty and varying aspects of critical thinking are reviewed in this section. Walthew (2004) conducted a study to gain understanding of nurse educators' conception of critical thinking. Walthew believed that studying the nurse educators' perceptions of critical thinking would lead to insight into teaching critical thinking. The purpose of this descriptive study was to examine nurse educators' perceptions of critical thinking. The researcher proposed two thoughts regarding critical thinking, the traditional view and the feminist view of critical thinking. The researcher used constructivism as a paradigm to guide the understanding of the conception of critical thinking held by the nurse educators.

Walthew's (2004) study was completed through semi-structured interviews lasting for approximately one hour. The questions asked were:

1. In your own words, can you tell me what you understand by the concept of critical thinking?
2. What is it about this piece of work that leads you to think the students are critically thinking?
3. What did you observe the student doing in the clinical area that made you think he or she was thinking critically (Walthew, 2004)?

The research took place in an urban environment in New Zealand. The nurse educators who participated were all in an instructor position in the tertiary institutes. A total of 12 nurse educators agreed to take part in the study (Walthew, 2004).

The data were analyzed using two methods. First, the researcher taped and transcribed the interview. The data were reviewed for emerging patterns; excerpts from the data were used to support the themes that were related. Morse and Field (1995) and Roundtree and Laing (1996) were used as a resource to guide the data analysis (Walthew, 2004).

Findings indicated that there were two central themes of critical thinking. The first and most common central theme was the traditional approach, which viewed critical thinking as a decision made with thought and information. The sub-themes included information gathering, pattern reorganization, practice linking theory, presenting arguments, and problem solving (Walthew, 2004). The nurse educators also considered the nursing process to be closely related to critical thinking. Attitude and dispositions were also seen as being essential to developing of critical thinking skills (Walthew).

The second theme that emerged from the analysis was the feminist view. This view is based on subjects' knowledge, intuition and emotions. Intuition is a feeling that helps a person assess situations and develop processes over time. Personal knowledge or experience affects the person's clinical decision making. Some participants felt that there were subjective components in our thinking that influenced our personal knowledge, which in turn affected our clinical decision making. This was based on the thought that reality could only be accurate by being consistent, impartial and non-arbitrary (Walthew, 2004). Walthew's study provided a definition of the conceptions of critical thinking as perceived by faculty.

Nurse educators believed that critical thinking was a process that required rational, logical, reflective thinking (Walthew, 2004).

Walthew (2004) recommended that the research be replicated in other nursing educational institutions due to the small sample size. Further research would provide nurse educators with more information to develop indicators of critical thinking that are effective with their program philosophies and goals.

In another study of critical thinking and nursing faculty, Zygmunt and Schaefer (2006) studied the critical thinking skills of faculty and the relationship between epistemological position and critical thinking. The authors emphasized that assessing critical thinking is a part of every nursing educator's realm of responsibility. Educators are expected to implement critical thinking and critical thinking skills into their subject matter in on-going bases, always updating and trying new things, to ensure that nursing students have the ability to critically think.

Zygmunt and Schaefer (2006) reviewed the current literature on critical thinking and found there were non-specific definitions of critical thinking. The authors proposed, based on the literature, that, if faculty viewed knowledge as absolute and dualistic, they would be generally unable to think critically. If the faculty viewed knowledge as relative and situational, faculty would have an easier time teaching with critical thinking skills. This research study was designed to:

1. Determine the critical thinking skills of the nurse faculty
2. Establish a benchmark of performance for critical thinking skills in nursing students
3. Examine the relationship between epistemological position and critical thinking skills of faculty (Zygmunt & Schaefer, 2006).

The researcher chose to develop a descriptive study and chose quantitative and qualitative methods to triangulate data and strengthen the study. Zygmunt and Schaefer (2006) chose to use the CCTST to measure critical thinking skills. The second instrument the researcher used was The Learning Environment Preference (LEP) (Moore, 1999) to assess the individual learning environment preference. This was selected due to its focus on components of the educational process and ease of completion. The CCTST is a 34-item multiple-choice instrument that was used to measure critical thinking ability. Reliability was supported by the Kuder Richardson value of 0.68 to 0.75. The CCTST reliability coefficient for this study was 0.86 (Zygmunt & Schaefer, 2006).

The LEP is a 65-item instrument, categorized into five positions: course content/view of learning, role of instructor, role of student/peers, classroom atmosphere/activities, and evaluation procedure. Participants were asked to respond using the 4 point Likert scale, from not all significant to very significant. Range of position was 2-5 with position five being indicative of critical thinking, one being viewing knowledge as absolute or dualistic. Criterion group reference and concurrent/construct validity were supported. Cronbach's alpha for each domain ranged from 0.63-0.84. Over all reliability of the test was 0.79 (Zygmunt & Schaefer, 2006).

The researchers developed a questionnaire in addition to the two standardized tests to obtain information regarding demographics. Included on this questionnaire were items such as age, gender, and years of experience. The investigators also conducted interview via phone with faculty who volunteered to share their experiences and describe their classroom or clinical incidences (Zygmunt & Schaefer, 2006).

Zygmunt and Schaefer (2006) chose a randomized national sample of 300 full time nursing faculties from the National League for Nursing. All types of nursing educational programs were included. Five packets were sent to the director of selected schools. Included in the packets were the CCTST, LEP, demographic questionnaire, a return envelope and the response card indicating their willingness to be interviewed (Zygmunt & Schaefer, 2006).

The results indicated a mean total score of 19.14 (SD±6.76) out of 34, in comparison to total scores of two norm groups of students, one enrolled in a four-year college and one in a graduate nursing program. The data for the CCTST and the demographic items were analyzed. A low negative correlation was found between age and the evaluation subscale [(r=-.289, p<.04)] (Zygmunt & Schaefer, 2006).

The LEP analysis indicated that no faculty viewed knowledge as absolute or dualistic reaching position 5 on the LEP test. However, when reviewing the results no faculty viewed knowledge in a way that was consistent with critical thinking, but scores indicated they were closer to position 5 than 3, indicating some forms of critical thinking. The total CCI LEP mean score was 395.41 (SD±28.70), indicating position 4 (Zygmunt & Schaefer, 2006). No correlation was found between the CCTST and the LEP results.

Most of the nursing faculty reported having no or little training in critical thinking. The nursing instructors do agree that there is a relationship between nursing education, clinical practice and critical thinking. The researchers and educators are unsure of the nature of that relationship. What the researcher did find that there are advanced cognitive skills needed to manage the complexities of the patients in today's health care environment (Zygmunt & Schaefer, 2006).

Results indicated that faculty are considerably more skilled at critical thinking than a typical senior in a four year program. The faculty achieved a score greater than 19 out of 34 70% of the time. Facione and Facione (1994a) reported nursing scores should be between 10-20, to represent critical thinking. This may present a relationship between the faculty ability to engage in critical thinking and the learner ability to learn critical thinking (Zygmont & Schaefer, 2006).

The data also suggest that, as faculty grows older, their ability to engage in learning is diminished. They can think relatively clearly in one situation but are unable to transfer thinking to another situation, suggesting an inflexible approach to teaching. Environmental factors can contribute to this change. Heavy workload, burnout and stress, can cause this type of thinking (Zygmont & Schaefer, 2006).

When looking at the LEP scores in reference to the CCTST scores, results indicate that the faculty can teach critical thinking, but no faculty achieved the critical thinking level of knowledge on the LEP viewing knowledge as absolute or dualistic. Responses of 70% of the faculty achieved the position 4 out of 5, indicating they could master feasibly critical thinking. The design of the LEP could have caused this result, since the questions are most amenable in the classroom setting. The author suggested that critical thinking has occurred in the clinical setting, although the relationship between classroom instruction and critical thinking was not well reviewed in this study (Zygmont & Schaefer, 2006). These results may also support the belief that critical thinking is a conscious cognitive process that may not involve the higher level cognitive skills that are required in reflection (Zygmont & Schaefer).

Zygmont and Schaefer (2006) concluded that the results suggest that the faculties are not equally skilled at critical thinking, and results from the LEP indicated that faculty may

not have developed intellectually to the point of thinking critically. These results demonstrate that the faculty appreciate the need for critical thinking in the discipline but are not positioned to teach it well in their theoretical approach to knowledge. In other words, nursing faculties understand critical thinking but continue to have difficulty in presenting this to the students. These results are limited due to the small sample size. The researchers recommend more study to be done regarding the idea of critical thinking and the faculty that are teaching critical thinking.

Critical Thinking as Measure of Curricular Outcomes

Several researchers have explored critical thinking as an outcome measure of nursing curricula. Beckie, Lowry, and Barnett (2001) decided to study the critical thinking abilities of nursing student in a BSN program before and after a curriculum change. Nursing educators changed curriculum to increase students' critical thinking abilities. Nursing students received the revised and updated curriculum during their junior year of educations. This research study was designed to answer the following questions:

1. What is the difference between critical thinking skills of the BSN student who completed the former nursing curriculum and those who complete the revised curriculum that promotes critical thinking?
2. What is the change over time in BSN students' critical thinking skills from entry into the junior year of an upper-division, BSN nursing program, at midpoint, and at exit (Beckie et al., 2001)?

The CCTST was the standardized test used in Beckie et al. (2001) study. This is a 34-item multiple choice instrument that targets six areas of critical thinking skills, analysis, evaluation, inference, deductive reasoning, explanation, and inductive reasoning.

Beckie, Barnett and Lowry (2001) developed a nonequivalent control group design study, using a pre/post test. The students were administered the CCTST at entry into the junior year of nursing, at the start of their senior year, and at the end of the senior year. Forty-five minutes were allowed each time for taking the test. After the entry level students had taken the CCTST, they began a course entitled Introduction to Clinical Judgment. This concept course was an introduction into critical thinking, the first didactic course of the junior year in the revised program. Instructors reinforced critical thinking in subsequent courses and clinical experiences to help develop critical thinking skills and/- judgment. The students were encouraged to be actively involved during the classroom setting, using groups, questioning and reflective journal writing. The students then were engaged in using case studies, evaluating their work and actively engaging their patient.

Beckie et al. (2001) compared the entry group (Cohort 1), the middle group (Cohort 2), and the exit group (Cohort 3) for any increase in critical thinking skills. An ANOVA statistic was used to test the difference between critical thinking skills of the Cohort 1 and 2 groups as measured by the CCTST total scores and the sub scores. Statistical significance was set at $p < .05$. To minimize the risk of type I error the authors used the Bonferroni procedures to correlate for inflated error rates related to multiple comparisons. Cohort 1 group was the baseline for measurement before the curriculum revision was implemented. Cohort 2 and Cohort 3 were the first two classes to experience the new revised curriculum. The ANOVA test revealed that Cohorts 1, 2, and 3 were statistically different on the total CCTST scores ($F=10.04$, $p<.001$) and on the subscales of analysis ($f=7.96$, $p<.001$), inductive reasoning ($F=9.28$, $p<.001$), deductive reasoning ($F=6.20$, $p<.003$), inference ($F=7.96$, $p<.001$) and the evaluation ($F=8.06$, $p<.001$) (Beckie et al., 2001). The researchers

then removed the effects for repeated testing and found that Cohort 2 showed a statistically significantly higher score compared with Cohort 1 on the total score. The researchers further found that there was a dramatic change in critical thinking scores between the entry level and the exit level scores on each of the subscales, with inductive reasoning being the greatest change ($p < .05$).

In conclusion, Beckie et al. (2001) addressed whether there was a difference in the critical thinking skills of the students who completed a revised curriculum that promoted critical thinking skills. This study was also to determine the change in critical thinking skills from entry to exit. The results showed that the first class achieved significantly higher critical thinking scores than the baseline cohort. Cohort 2 group showed a large improvement on all subscales. This resulted in a positive outcome after the curriculum revision. Cohort 3 group failed to demonstrate improvement on scores over a period of time. Beckie, Lowry, and Barrett (2001) reviewed several explanations as to the lack of improvement of the cohort 3 group. Distractions during testing were cited as several reasons for the students to do poorly. The researchers felt that the students were unmotivated, just wanting to graduate, where as the Cohort 2 students were interested in learning and trying their best.

Spelic, Parsons, Hercinger, Andrews, Park and Norris (2001) developed a study to evaluate whether the curriculum outcomes had impacted the students. This school chose to define critical thinking as the process of purposeful, self regulatory judgment that included cognitive skills of interpretation, analysis, evaluation inference, explanation and self regulation (Spelic et al., 2001). The authors chose the CCTST (Facione & Facione, 1992) as the standardized measure of critical thinking for the students. The authors believed that the

CCTST was a newer and more useful instrument than the Watson Glaser CT Appraisal. The authors also reported that the CCTST related to the way nursing as a discipline viewed critical thinking (Spelic et al., 2001).

The study took place in a BSN program over a three-year period. The first program was a traditional 4-year track. The second was an accelerated nursing program where students completed a bachelor's or higher degree in another field with prerequisite courses. The third track was called a Linking Education Practice for Licensed (LEAP) RN's. All participants had completed one full calendar year of full time study. All students were administered the CCTST on admission into the nursing program and then again on exiting the program. A total of 136 students completed the CCTST on entry and exit of the program. Only students who completed the educational track were included into the study. This test was administered in the classroom setting at a pre-set time. The students had 45 minutes to complete the test. The CCTST is a 34-item test giving a total score and 5 sub-scores (Spelic et al., 2001).

A t-test was computed to analyze the pre and post test differences in students' scores. The results showed that all of total scores were statistically significant for all 3 types of programs (Spelic et al., 2001). These results showed there was an increase in critical thinking abilities of the students from the entry level to the exit level. The one exception to the results were with the LEAP students who scored higher on the analysis subscale on exit than on the entry (Spelic et al., 2001).

The limitation of this study included a small number of LEAP students. When reviewing the threat of external validity, it was not clear if the 17 LEAP nursing students entered the testing site at different times and intervals. The instructors had difficulty

scheduling and conducting data collection. This may have resulted in omission of entry level data as well as exit.

Conclusion

NLN requires nursing programs to develop critical thinking in nursing students. Every accredited school has incorporated critical thinking into their curriculum. How critical thinking is measured varies across programs. According to the research, the standard instruments used for measuring critical thinking are CCTST, CCDTI, and possibly the NCLEX-RN exam.

McCarthy et al.'s (1999) research study supported the use of the CCTST and the CCDTI in evaluating the critical thinking skill of the nursing students. Shin et al. (2006) also demonstrated that the CCTST and the CCDTI were adequate measures of critical thinking skills. In Stone et al.'s (2001) study that looked at the validity of the measuring critical thinking skills of students using the CCTST and the CCDTI, the authors found a positive correlation between the two, as did the study by Shin et al. Giddens and Gloeckner's (2005) study looked at the relationship of the CCTST and the CCDTI to the performance on the NCLEX-RN. The researchers found that the CCTST and the CCDTI scores predicated the outcome of the NCLX-RN exam.

Adams et al. (1999) chose to use Watson-Glaser Critical Thinking Appraisal (Watson & Glaser, 1980a) to assess critical thinking skills of the nursing student in a 4 year nursing program. The authors' data revealed no increase in critical thinking skills from the sophomore to the senior level of the nursing program. The author reported that the WGCTA was not a good instrument to use in the field of nursing, due to the lack of focus on nursing. McCarthy et al. (1999) research found a significant difference in the critical thinking of the

sophomore nursing student to the senior nursing students. Baker's (2002) research also identified significant differences between the sophomore and senior critical thinking ability based on the results of the CCTST and CCTDI.

Data have been collected regarding the difference in critical thinking skills and critical thinking dispositions of nursing students at varying curricular levels. Stone et al. (2001) identified a positive correlation with the CCTST, CCTDI and the SAT. Giddens and Gloeckner's (2005) results supported that the CCTST and CCTDI were positively related to passing the NCLEX-RN exam.

Stewart and Dempsey (2005) also supported that there was a difference between sophomore and junior level nursing student in their critical thinking abilities. There was no difference between the sophomore level and the senior level nursing student's ability to critically think. Profetto-McGrath's (2001) research did not support a difference in critical thinking ability of the sophomore nursing students to the senior nursing students. Similar to Stewart and Dempsey's research, Profetto-McGrath also identified an increase in critical thinking ability of the students from the sophomore to the junior level but no increase from the sophomore to senior year.

Facione and Facione (1991) identified critical thinking skills as the ability to concisely analyze, interpret, self-regulate, infer, explain and evaluate. Experts in the nursing field continue to disagree on the definition of critical thinking and how to measure critical thinking in the nursing environment. Walthew's (2004) research suggested that there are two forms of critical thinking that faculty may hold, one being the traditional approach and the second being a feminist view. The traditional approach is based on thoughts and information, similar to placing pieces of a puzzle together. The second or feminist view is

based on a person's personal knowledge, emotion and intuition. Zygmunt and Schaefer (2006) developed a study to identify if nursing instructors could teach critical thinking. The research proposed based on the literature that, if faculty members view knowledge as absolute and dualistic, they would be generally unable to think critically. If faculty members viewed knowledge as relative and situational the faculty would have an easier time teaching critical thinking. These results demonstrated that the faculty appreciated the need for critical thinking in the discipline but were not positioned to teach it well. In other words, nursing faculties understand critical thinking but continue to have difficulty in presenting critical thinking to their students.

Nursing schools continue to redefine their mission statements and update their curriculum to include critical thinking. As a result of changing the curriculum, has there been an increase in critical thinking? Beckie, Lowry, and Barnett (2001) evaluated a school for critical thinking skills after a curriculum change. The researcher found a dramatic change in the critical thinking skills of the students from entry to middle, with little change from middle to exit. The author attributed this finding to "senioritis", or that the students may have been unmotivated, just interested in graduating. Spelic et al. (2001) researched critical thinking in three different tracks in a nursing program. The researchers' defined the program outcomes to include the definition of critical thinking and included this process throughout the curricula. Their results supported an increase in critical thinking in all three programs.

In conclusion, the research supports using the CCTST and the CCTDI as tools for measuring critical thinking in nursing students. Further research is needed to identify curricula that increase the students' critical thinking skills and continue to expand this knowledge throughout their educational process. Faculty need to have more education on

ways to teach or present critical thinking to nursing student and incorporate these ideas into the clinical setting. Critical thinking skills and critical thinking dispositions are not new ideas for nursing; nurse educators need to continue to find ways to identify that critical thinking skills are evolving across curricular levels.

Chapter III

Methodology and Procedures

Introduction

In today's healthcare environment, patients are complex and commonly very ill. This increase in acuity of patient care increases the demand for nurses to have critical thinking skills. Nursing education programs teach critical thinking to students and measure critical thinking as a program outcome. However, little is known about how critical thinking develops across time during nursing programs. More research is needed on critical thinking skills in students who are beginning a nursing curriculum and those who are concluding a nursing curriculum.

The purpose of this study is to examine differences between critical thinking skills and critical thinking dispositions in the second-year nursing students and senior-year nursing students. It is a partial replication of Profetto-McGrath's (2002) study, which was designed to investigate critical thinking skills among baccalaureate nursing students.

Research Questions

The following research questions guided this study:

1. What critical thinking skills (CTS) and critical thinking dispositions (CTD) do nursing students possess during the last semester of a baccalaureate curriculum?

2. Do scores on the CCTST and the CCTDS differ between samples of nursing students in the second year of a baccalaureate nursing curriculum and a sample of nursing students in the final year of a baccalaureate nursing program?
3. Is there a relationship between baccalaureate nursing students CTS and CTD scores?

Sample, Population, and Setting

The setting was a private four year school of nursing program in the Midwestern United States. The program was a baccalaureate nursing program accredited by the National League of Nursing. The students typically attended lecture two days per week, as well as 6-12 clinical hours per weeks and one lab day per week. The program had a traditional and non-traditional track. The traditional students were right out of high school, going directly into the nursing program. The non-traditional students came into the program from different academic settings or second career students.

The population for this study was nursing students enrolled in one four-year baccalaureate program. The sample consisted of 228 nursing students enrolled in the targeted program. Inclusion criteria for the sample were: (a) 18 years of age and older; (b) able to read English; and (c) enrolled in the first semester of the second year of the targeted baccalaureate curriculum. There were no exclusions for the sample related to gender or ethnicity. There were no exclusions for the traditional vs nontraditional students, but data were separated out so that the two different areas could be compared.

Protection of Human Subjects

This study was approved by the Institutional Review Board of the targeted university. The nursing dean and the nursing program chairs gave permission to conduct the study in

their program. Participants were invited to be in the study through an invitation posted on the school's internet web site. This invitation included information on the study, objectives, participants' rights and a copy of the informed consent statement. Interested respondents contacted the researcher to express a desire for more information.

Participants were informed that participation in the study was strictly voluntary and student nurses could withdraw from the study at any given time. Participation or non-participation did not affect their academic standing. Faculties at the school were not aware of who participated and who did not participate. Participants' participation was anonymous. Instruments were coded numerically to allow data to be tracked from the first data collection at Time 1 in the second year of the program to the second data collection at Time 2 in the last year of the program. Participants were also asked to provide contact information in order to contact them for Time 2 data collection. The participants were informed that they could skip any item on the instrumentation.

All data were kept confidential. Participants placed completed instruments in a sealed envelope and deposited them in a central drop box in the school of nursing. Signed consent forms and completed instruments were seen only by the researcher, along with the coding list with participants' names or the contact information. The surveys were kept in a locked file cabinet in the office of the researcher. The signed consents were kept in a separate locked file drawer in the office of the researcher. The list of participants' names and codes were kept in a third locked file drawer in the office of the researcher. All data were destroyed at the completion of the study.

Procedure and Instrumentation

The CCTST (Facione, 2000), CCTDI (Facione, 2000) and a background/demographic questionnaire will be used to collect the data. The CCTST is a 34-item multiple choice instrument that measured critical thinking ability through six subscales. The subscales measures interpretation, comprehension, analysis, evaluation, inference, and explanation, each with four options. Total score ranged from 0-34.

The CCTDI measured affective attitudes related to critical thinking. The CCTDI consisted of 75 statements with a six-point Likert response scale from strongly disagree to strongly agree. The CCTDI was broken down into seven scales including truth seeking, open-mindedness, analyticity, systematicity, critical thinking, self confidence, inquisitiveness and maturity of judgment. Demographic data were also requested at Time 1, specifically age, ethnicity and gender.

Participants who indicated an interest in participating in the study met with the researcher at a mutually agreeable time and signed an informed consent. Then participants went to a designated classroom in the school and received instructions. After the researcher had left the room, participants completed the CCTDI and the CCTST, which constituted Time 1 data collection. No faculty members were present at the time of data collection. Completed questionnaires were placed in a sealed envelope and deposited in a central collection box in the school of nursing.

This data collection was done over a period of two weeks. Two years later, as participants entered the final semester of the nursing program, participants were contacted to set a time for Time 2 data collection.

At Time 2, participants received a coded questionnaire, consisting of the CCTST and the CCTDI. No further demographic data were collected at Time 2. Completed questionnaires were placed in a sealed envelope and deposited in a central collection box in the school of nursing.

Internal consistency reliability measured for the CCTST has been reported at 0.68-0.70 using the Kuder Richardson 20 formula (KR-20) statistic (Facione & Facione, 1994a). The KR-20 statistic is one of the most widely used methods for estimating reliability in multiple choice measures of knowledge and ability. The Cronbach alpha internal consistency measured reliability of the CCTDI. The overall reliability for the tool was 0.91 (Profetto-McGrath, 2002). The Cronbach alpha coefficients of subscales in previous research were: truth seeking (alpha = 0.70), systematicity (alpha = 0.73), inquisitiveness (alpha = 0.84), open-mindedness (alpha = 0.64), confidence (alpha = 0.70), maturity (alpha = 0.70), and analyticity (alpha = 0.84). A Delphi study supported the CCTDI's construct and concurrent validity (Profetto-McGrath, 2002).

Research Design

This study design is a longitudinal repeated measure design, a partial replication of Profetto-McGrath (2002) study, which was designed to measure critical thinking skills and critical thinking dispositions in baccalaureate nursing students. The present study was arranged to measure CTS and CTD in nursing students at two different levels of the nursing curriculum.

Intended Method of Data Analysis

Both descriptive and inferential statistics were used to analyze the data. The descriptive statistics for the CCTST and CCTDI scores included calculation of the mean,

standard deviation, modes, minimum and maximum scores, percentages, and confidence intervals. Inferential statistics were used to test the difference between scores of students at the two curricular levels.

The first research question was answered using descriptive statistics to describe the participants' scores on critical thinking skills and critical thinking dispositions at Time 2. Participants' subscale scores were to be computed. The answer to this research question will reveal the mean scores of participants on scales and subscales of the CCTST and CCTDI and allow for benchmarking at the time of graduation with other schools.

The second research question was addressed by a repeated measures analysis of variance. Analysis of variance (ANOVA) is a statistic that measures the difference between means. A t-test can also be used to measure the difference between means. Researchers believe that the ANOVA is a more rigorous approach to statistical analysis. Through an ANOVA, total scores and subscale scores on the CCTST and CCTDI will be compared between second-year and senior-year students. Assumptions of the ANOVA included interval-level data, independent observations, homogeneity of variance and the normal distribution of the population or a random sample (Burns & Grove, 2005). Data in this study will likely meet the requirements to use this statistic.

The third research question was answered by a Pearson r correlation between scores on the CCTSI and scores on the CCDST at time 1 and time 2 for total scores and subscale scores. The subscale scores and the total scores on both instruments were measured as interval level data, a requirement for the using the Pearson r .

Summary

Critical thinking abilities are required in nursing practice due to the acuity of ill patients and the complexity of the current health care environment. Nursing students learn to think critically as they progress through a nursing curriculum. Research has not consistently demonstrated the difference in critical thinking abilities in students as varying levels of nursing curricula. The purpose of this study was to examine differences between critical thinking skills and critical thinking dispositions in sophomore nursing students and senior year nursing students. Information obtained from this study will guide nurse educators in the development of critical thinking skills and dispositions. The results of this study will be compared to the results of the Profetto-McGrath (2002) study on critical thinking among baccalaureate nursing students.

References

- Adams, M., Stover, L., & Whitlow, J. (1999). A longitudinal evaluation of baccalaureate nursing students' critical thinking abilities. *Journal of Nursing Education, 38*(3), 139-143.
- Baker, D. (2002). A longitudinal study of critical thinking skills in baccalaureate nursing students. *The University of Memphis*. AAT 3069487.
- Bauwens, E.E., & Gerhard, G.G. (1987). The use of the Watson-Glaser Critical Thinking Appraisal to predict success in a baccalaureate nursing program. *Journal of Nursing Education, 26*, 278-281.
- Benner, P. (1984). *From Novice to Expert: Excellence and Power in Clinical Nursing*. Menlo Park, CA: Addison-Wesley.
- Beckie, T., Lowry, L.W., & Barnett, S. (2001). Assessing critical thinking in baccalaureate nursing students: A longitudinal study. *Holistic Nursing Practice, 15*(3) 18- 27.
- Billings, D., & Halstead, J. (2005). *Teaching in Nursing*. (2nd ed.) St. Louis, Missouri: Elsevier.
- Burns, N., & Grove, S. (2005). *The Practice of Nursing Research*. (5th ed.) St Louis, Missouri: Elsevier.
- Dressel, P., & Mayhew, L. (1954). General education: exploration in evaluation (final report of the Cooperative Study of Evaluation in General Education). Washington, DC: American Council on Education.
- Facione, P. (1990). Critical thinking: a statement of expert consensus for purposes of educational assessment and instruction. *The Delphi Report: Research Findings and*

Recommendations of the American Philosophical-Association (ERIC Document No. ED315-423)

Facione, P. (1991). *The California Critical Thinking Skills Test Form A*. Millbrae, CA: California Academic Press: 1991.

Facione, P., & Facione, N. (1991). *The California Critical Thinking Skills Test Form A*. Millbrae, CA: California Academic Press: 1991.

Facione, P. (1992). *The California Critical Thinking Skills Test Form A*. Millbrae, CA: California Academic Press: 1992.

Facione, P., & Facione, N. (1992). *The California Critical Thinking Skills Test Form A*. Millbrae, CA: California Academic Press: 1992.

Facione, N. (1994). *The California Critical Thinking Skills Test Form A: Test Manual*. Millbrae, CA: California Academic Press; 1993.

Facione, P., & Facione, N. (1994a). *The California Critical Thinking Disposition Inventory (CCTDI): Test Manual*. Millbrae, CA: California Academic Press.

Facione, P., & Facione, N. (1994b). *The California Critical Thinking Disposition Inventory (CCTDI): Test Manual*. Millbrae, CA: California Academic Press.

Facione, P., Facione, N., & Sanchez, C. (2001). *The California Critical Thinking Disposition Inventory: Test Manual*. Millbrae, CA: California Academic Press.

Facione, P. (2000). *The California Critical Thinking Skills Test Form A*. Millbrae, CA: California Academic Press.

Giddens, J., & Gloeckner, G. (2005). The relationship of critical thinking to performance of the NCLEX-RN. *Journal of Nursing Education*, 44(2), 85-90.

- McCarthy, P., Schuster, P., Zehr, P., & McDougal, D. (1999). Evaluation of critical thinking in a baccalaureate nursing program. *Journal of Nursing Education, 38*(3), 142-145.
- McEwen, M., & Brown, S.C. (2002). Conceptual frameworks in undergraduate nursing curricula: Reports of a national survey. *Journal of Nursing Education, 41*, 5-14.
- Miller, M.A., & Babcock, D.E. (1996). *Critical Thinking Applied to Nursing.*, St. Louis, Missouri: Mosby-Year Book.
- Moore, W.S. (1999). *The Learning Environment Preferences: An Instrument Manual.* Olympia, WA: Center for Intellectual Development.
- Morse, J., & Field, P. (1995). *Qualitative Research Masters for Health Professionals* (2nd Ed.) London, UK: Sage.
- National Council of State Boards of Nursing. (2000). *Test Plan for the National Council Licensure Examination for Registered Nurses.* Chicago: Author. Retrieved May 25, 2007, from <http://www.ncsbn.org>
- National League for Nursing Accrediting Commission (NLN-AC). (1997) *Interpretive Guidelines for Standards and Criteria.* Council of Baccalaureate and Higher Degree Programs. New York: New York.
- Profetto-McGrath, J. (2002). The relationship of critical thinking skills and critical thinking dispositions of baccalaureate nursing students. *Journal of Advanced Nursing, 43*(6), 569-577.
- Roundtree, K., & Laing, T. (1996). *Writing by Degrees: A Practical Guide to Writing Theses and Research Papers.* Auckland, New Zealand: Addison Wesley Longman.

- Shin, K., Jung, D.Y., Shin, S., & Soo Kim, M. (2006). Critical thinking dispositions and skills of senior nursing students in associate, baccalaureate, and RN-to-BSN programs. *Journal of Education*, 46(6), 233-238.
- Staib, S. (2003). Teaching and measuring critical thinking. *Journal of Nursing Education*, 42(11), 498-512.
- Spelic, S., Parsons, M., Heringer, M., Andrews, A. et al. (2001). Evaluation of critical thinking outcomes of a BSN program. *Holistic Nurse Practice*, 15(3), 27-28.
- Stewart, S., & Dempsey, L. (2005). A longitudinal study of baccalaureate nursing students critical thinking dispositions. *Journal of Nursing Education*, 44(2), 81-84.
- Stone, C., Davidson, L., Evans, J., & Hansen, M. (2001). Validity evidence for using a general critical thinking test to measure nursing student's critical thinking. *Holistic Nursing Practice*, 15(4), 65-67.
- Sullivan, E. (19987). Critical thinking, creativity, clinical performance and achievement in RN students. *Nurse Educator*, 12(2), 12-16.
- Walthew, P. (2004). Conceptions of critical thinking held by nurse educators. *Journal of Nursing Education*, 43(9), 408-412.
- Watson, G., & Glaser, E.M. (1980a). *Watson-Glaser Critical Thinking Appraisal Manual*. San Antonio: The Psychological Corporation.
- Watson, G., & Glaser, E.M. (1980b). *Watson-Glaser Critical Thinking. Forms A&B*. New York: The Psychological Corporation.
- Zygmont, D., & Schaefer, K. (2006). Assessing the critical thinking skills of faculty: what do the findings mean for nursing education? *Nursing Education Perspectives*, 27(5), 260-268.