The Effect of the Developing Nurses’ Thinking Model on Clinical Judgment in Nursing Students

by

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Abstract

Critical thinking and clinical judgment are essential competencies for professional nursing practice. These abilities are used continually, enabling nurses to provide safe nursing care to increasingly complex patients in a variety of healthcare settings. The challenge that faces baccalaureate nursing programs as they prepare nursing students to function competently upon graduation, is how best to facilitate the development of these skills in our students. The purpose of this capstone project was to test the effect of the middle range theory of the Developing Nurses’ Thinking (DNT) Model on clinical judgment in nursing students. Tanner’s Clinical Judgment Model formed the conceptual framework for this project. An experimental, pretest/posttest study was conducted using a convenience sample of 44 senior students at one southeastern baccalaureate nursing program. Two clinical groups received the intervention in post conferences, while three groups served as the control group. Student clinical judgment was measured in high fidelity patient simulation, using the Lasater Clinical Judgment Rubric. Paired t-tests evaluated the differences between clinical judgment scores and an independent t-test was utilized to evaluate the difference between groups. Both groups showed statistically significant improvements on the posttest, but there was no statistically significant difference between groups. Therefore, the findings of this study did not support the use of the DNT Model to facilitate the development of clinical judgment in nursing students. However, small sample size and inadequate exposure to the intervention were likely contributors to these outcomes.

Keywords: critical thinking, clinical judgment, nursing education, patient safety, simulation
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“For the Lord is good;
His loving kindness is everlasting
And His faithfulness to all generations.”

Psalm 100:5
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CHAPTER I

Introduction

Since the Institute of Medicine’s (IOM) landmark report exposing the impact of medical errors on patient outcomes, financial cost, and loss of confidence in the system, safety has become a priority in healthcare (Kohn, Corrigan, & Donaldson, 2000). Nurses, as the largest group of healthcare professionals, are in a place of opportunity. Nurses have been a part of the problem and they have the potential to be a part of the solution. In response to the IOM’s report, the American Association of the Colleges of Nursing (AACN) produced The Essentials for Baccalaureate Education for Professional Nursing Practice, which serves as a blueprint for transforming baccalaureate nursing education. This document acknowledges that nurses have the potential to have a major influence in transforming healthcare in America, making it a safer, higher quality system. The AACN cites critical thinking and clinical reasoning as core concepts in this transformation (American Association of Colleges of Nursing [AACN](2008). These skills are foundational to every aspect of the nursing process and are essential to competent practice (Banning, 2008).

Baccalaureate nursing programs are charged with producing graduates who are able to use the nursing process appropriately to provide a high quality of nursing care; care which promotes patient safety (AACN, 2008). Patient safety is dependent on the nurse’s ability to assess, diagnose, plan, implement, and evaluate patient responses to health problems. Critical thinking and clinical reasoning form the foundation for nursing judgment and are used continually in nursing practice. The challenge that faces baccalaureate nursing programs is how best to facilitate the development of these skills in
our students. Nurse educators must continue to develop the evidence base and validate educational strategies that promote this goal, so that the learning needs of nursing students are met, so we can continue to provide quality health care in our society.

**Problem Statement**

Nurses must use clinical judgment in their professional practice in order to deliver safe patient care. Nurses face many challenges to safe practice. The settings in which nurses practice are diverse. Nurses provide care for patients who have increasingly complex medical conditions and treatments, whether they are cared for in the hospital, the clinic, in school, or at home. Changes in technology, science, and even our present political climate contribute to the complexity of the healthcare environment in which they practice. Innovation fuels the need for continuously learning to use new skills and new technology. In addition to these challenges, the nursing shortage and changes in reimbursement have led to nurses practicing with increased, often unsafe patient loads (Benner, Sutphen, Leonard, & Day, 2010). This is the world of nursing that new graduate nurses are entering. It is the responsibility of baccalaureate programs to prepare these students to function competently and safely in this environment.

While it is clear that critical thinking and clinical judgment are essential skills for the new graduate as well as for the experienced nurse, research suggests that up to 30% of new graduate baccalaureate prepared nurses lack the clinical judgment necessary for safe patient care (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). Much research has been conducted, exploring methods and strategies for increasing the critical thinking abilities of nursing students. Results have been mixed, and there is a lack of consensus on the best way to teach these essential skills.
Significance

Evidence of the consequences of poor critical thinking and clinical judgment in nursing practice is common in the literature. Failure to rescue often occurs because the nurse does not notice changes in patient condition, interpret those changes correctly, or respond appropriately. These are all components of clinical judgment (Schubert, 2012). One Australian study linked critical incidents in patient care to new graduate nurses’ poor clinical judgment skills, and another study documented a failure to address patients’ deterioration in condition related to poor clinical judgment (Levett-Jones, et al., 2010). A recent review of the literature revealed that new graduate nurses were less likely to notice cues in their assessments, identify patient situations, and recognize complicated diagnoses than experienced nurses. They have been shown to reevaluate patient data less frequently, and became less effective in clinical reasoning as uncertainty or complexity of the situation increased (Simmons, 2010). It is evident that nursing education must better prepare their graduates to exercise critical thinking and clinical judgment in practice.

Project Purpose

The purpose of this capstone project was to evaluate the effect of using the Developing Nurses’ Thinking (DNT) Model as a teaching tool on the clinical judgment of senior baccalaureate nursing students. To accomplish this, the study by Tesoro (2012) on developing nurses’ thinking was partially replicated. Permission was obtained from the author to use her model, tools, and teaching resources in this study. The design of this study was experimental, with one control and one intervention group of approximately 23 students each. It took place during the fall semester, the third semester of a four-semester baccalaureate program. The intervention group was taught to use the Developing Nurses’
Thinking (DNT) Model as an aid to accurately determine nursing diagnoses in clinical post-conferences for two consecutive weeks. The control group had their usual post-conferences during this time. Instead of using case studies and diagnostic accuracy as the tool for evaluation as Dr. Tesoro did in her study, clinical judgment outcomes were evaluated in high fidelity human patient simulation (HFHPS) as measured by the Lasater Clinical Judgment Rubric (LCJR). This rubric measures the concepts in Tanner’s Clinical Judgment model, which was the conceptual framework for this study. The core concepts of this model are noticing, interpreting, responding, and reflecting (Lasater, 2006). Permission was obtained from the author to use the rubric in this study. The tool has been evaluated for construct validity and interrater reliability was calculated at 90% (Lasater & Nielsen, 2009).

**Project Question**

The research question asked how does the DNT Model affect nursing students’ clinical judgment? This capstone project examined the outcomes of using the Developing Nurses’ Thinking (DNT) Model as the intervention by measuring pre- and post-intervention scores. Student clinical judgment in simulation was evaluated using the Lasater Clinical Judgment Rubric.

**Definition of Terms**

The terms clinical judgment, clinical reasoning, decision-making, and problem-solving have been used interchangeably in the nursing literature. As a result, some confusion exists about definitions, teaching, and evaluation of these concepts. For purposes of this study, the following definitions were used:
• **Critical thinking.** Critical thinking is described as a broad term which encompasses the concept of clinical reasoning and is an antecedent to clinical reasoning (Simmons, 2010). A classic definition of critical thinking was published in 1990 as a result of an American Philosophical Association research project using the Delphi Method. Critical thinking was defined by this group of experts as “purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, inference, as well as the explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment was based” (Facione, 1990, p. 2). This report also included affective characteristics that are commonly found in critical thinkers. The American Association of Colleges of Nursing (AACN) (2008) defines critical thinking as it applies to nursing education as, “the process of questioning, analysis, synthesis, interpretation, inference, inductive and deductive reasoning, intuition, application, and creativity… underlies independent and interdependent decision making.” This AACN definition is the one which was utilized in this study.

• **Clinical reasoning.** Clinical reasoning in nursing is defined as a “complex cognitive process that uses formal and informal thinking strategies to gather and analyze patient information, evaluate the significance of this information and weigh alternative actions” (Simmons, 2010, p. 1155). Clinical reasoning focuses on the cognitive processes used to arrive at the destination, whereas clinical judgment is the destination itself, the conclusion of the thinking process (Simmons, 2010). Benner used the term conceptual reasoning to refer to this
same concept, and considered it a pre-requisite for problem-solving in nursing (Benner, 1984).

- **Clinical judgment.** The AACN succinctly defines clinical judgment as, “the outcomes of critical thinking in nursing practice” (AACN, 2008, p. 36). Clinical judgment is described Benner, Tanner, and Chesla (2009) as: “…ways in which nurses come to understand the problems, issues, or concerns of clients/patients, to attend to salient information and to respond in concerned and involved ways” (p. 2). Although these are valid definitions, Tanner uses a broader one which was used in this study. Tanner defines clinical judgment as, “an interpretation or conclusion about a patient’s needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p. 204). Clinical judgments begin with a goal in mind and involve evidence, meaning, decisions to act, and patient outcomes.

- **Simulation.** Human patient simulation (HPS) is defined as, “activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through techniques such as role playing and the use of devises [*sic*] such as interactive videos or mannequins” (Jeffries, 2005, p. 97). According to the 2013 Standards of Best Practice for nursing simulation, high-fidelity human patient simulation (HFHPS) is defined as, “Experiences using full-scale computerized patient simulators, virtual reality, or standardized patients that are extremely realistic and provide a high level of interactivity and realism for the learner” (Meakim et al., 2013, p. S6).
Summary

Critical thinking and clinical judgment are essential to professional nursing practice and therefore, to baccalaureate nursing education (AACN, 2008). Patient safety is dependent on the nurse’s ability to think critically about each unique, often complex situation in order to make prudent judgments about patient care. This capstone project has contributed to the literature by demonstrating the effects of using the Developing Nurses’ Thinking (DNT) Model on the clinical judgment of student nurses as evidenced in HFHPS.
CHAPTER II

Research Based Evidence

This study on the Effect of the Developing Nurses’ Thinking Model on Clinical Judgment in Nursing Students is significant for nursing education and practice. In the Essentials for Baccalaureate Education for Professional Nursing Practice, the American Association of Colleges of Nursing (AACN) lists critical thinking and clinical reasoning as core competencies for graduates of baccalaureate nursing programs (American Association of Colleges of Nursing (AACN), 2008). While it is clear that critical thinking and clinical judgment are essential skills for the new graduate nurse as well as for the experienced nurse, research suggests that up to 30% of new graduate baccalaureate prepared nurses lack the clinical judgment necessary for safe patient care (Fero et al., 2009). Much research has been conducted to investigate the efficacy of varying methods and strategies for increasing the critical thinking abilities of nursing students. Results have been mixed and there remains a lack of consensus on the best way to teach these essential skills. However, it is evident that nursing education must better prepare their graduates to use clinical judgment in their professional practice so that they can provide safe, competent care to their patients.

Review of the Literature

This chapter focuses on review of current research on the development and evaluation of clinical judgment in nursing students. Because the terms critical thinking, clinical reasoning, and clinical judgment are used interchangeably in the literature, studies on critical thinking and clinical reasoning in nursing students are included in this review. Educational strategies used to develop critical thinking and clinical judgment in
nursing students and nursing practice are discussed. Sources used for the literature review were the Cumulative Index for Nursing and Allied Health Literature (CINAHL), CINAHL Plus with Full Text, Academic Search Complete Health Source: Nursing / Academic Edition, MEDLINE (at EBSCOhost), and Research Library at ProQuest. Search terms used included clinical judgment, critical thinking, clinical reasoning, nursing education, nursing student, novice nurse, and new graduate nurse.

**Clarification of concepts**

The concepts of critical thinking, clinical reasoning, and clinical judgment are interrelated concepts, but the terms have been used interchangeably in nursing literature. This has led to confusion regarding their definitions and their outcomes. It is essential for teaching and evaluating these concepts to clearly differentiate between them. A recent literature review sought to clarify these three concepts and suggest means for measuring their outcomes. The study defined the three concepts in relation to nursing education and practice (Victor-Chmil, 2013).

Based on a review of the literature, the author (Victor-Chmil, 2013) defined critical thinking as, “the cognitive processes used for analyzing knowledge based on evidence and science” (p. 36). Though not discipline specific, critical thinking is the central process necessary for clinical reasoning in nursing. A number of tools have been developed to measure critical thinking. These include the Watson-Glaser Critical Thinking Appraisal (WGCTA) and the California Critical Thinking Skills Test (CCTST), which have been validated and shown to be reliable instruments.

Victor-Chmil defined clinical reasoning as, “the cognitive and metacognitive processes used for analyzing knowledge relative to a clinical situation or specific patient”
(2013, p. 36), and as a prerequisite for clinical judgment. Clinical reasoning is viewed as the application of critical thinking to the clinical situation. Unlike critical thinking, no valid and reliable tools are presently available to measure this concept.

The concept of clinical judgment found in this literature review was influenced by Tanner’s Clinical Judgment Model. Victor-Chmil (2013) defined clinical judgment as, “cognitive, psychomotor, and affective processes demonstrated through action and behaviors within the 4 phases of clinical judgment: noticing, interpreting, responding, and reflecting” (p. 36). The nurse’s application of these three concepts results in sound decision making and safe, competent practice. One instrument was identified that measures clinical judgment using Tanner’s constructs; the Lasater Clinical Judgment Rubric (LCJR). This tool is discussed further in the next chapter.

**Clinical reasoning**

Critical thinking is a component of clinical reasoning, which is an integral part of clinical judgment. These skills are essential to safe, professional nursing practice. Because of the ambiguity in use of these terms in the literature, Simmons (2009) explored the concept of clinical reasoning using Rodgers’s evolutionary method of concept analysis. This method was appropriate because the concept of clinical reasoning is still evolving within the discipline of nursing. Her work has provided us with a middle-range descriptive theory of clinical reasoning in nursing.

Based on her concept analysis, Simmons (2009) defined clinical reasoning in nursing as, “a complex cognitive process that uses formal and informal thinking strategies to gather and analyse [sic] patient information, evaluate the significance of this information and weigh alternative actions” (p. 1155). The study of clinical reasoning in
nursing focuses on the cognitive processes used to think through health care problems and is concerned with the consequences as well as the thought processes involved. Essential attributes of clinical reasoning are cognition, metacognition, and domain-specific knowledge. Simmons notes that though Benner did not use the term clinical reasoning, the concept fits Benner’s From Novice to Expert model of skills acquisition in nursing. Clinical judgment is the end result of these processes (Simmons, 2009).

**Critical thinking application**

The relationship between critical thinking and clinical judgment in nursing practice is unclear. Standardized critical thinking tests have been used for decades to measure critical thinking, but the relationship of these test outcomes to clinical performance was unknown. A study was recently undertaken to explore the relationship between outcomes of critical thinking assessments and nursing student performance in a simulated clinical experience (SCE) (Fero et al., 2010). The study compared results of two critical thinking instruments with performance simulated clinical experiences. Two tests, the California Critical Thinking Disposition Inventory (CCTDI) and California Critical Thinking Skills Test (CCTST) measured the disposition towards using critical thinking in problem solving, and critical thinking ability, respectively. These tests have been shown to be valid and reliable in multiple studies. The SCE used in this study included the use of videotaped vignettes and high fidelity human patient simulation (HFHPS). Because evaluation of critical thinking in SCE is not yet standardized, a researcher-developed tool was used for this research. Content validity and interrater reliability were established for the tool.
For the study, junior baccalaureate nursing students completed both the CCTDI and CCTST, and then were randomized to an SCE, using either videotaped vignettes or HFHPS. Test results demonstrated that although the students had average to high scores on the CCTDI and CCTST, the majority failed to meet expectations in simulated performance, suggesting that a direct correlation cannot be made between critical thinking ability and the use of clinical judgment in clinical performance. However, HFHPS outcomes most closely approximated critical thinking scores. Limitations of this study include that it was a convenience sample and that students performed in the HFHPS alone, which may have increased anxiety. Also, performance in clinical practice may differ from stated or observed practice in a simulated environment. The authors recommended continued research to explore the relationship of simulation-based performance to that in the clinical setting.

**Significance to Nursing Practice**

**Preparation for professional practice.** A recent national survey by the Nursing Executive Center of the Advisory Board Company, a global research and consulting firm that serves health care and higher education, supports the finding that many new nurses are not adequately prepared for practice upon graduation. The survey, which was administered to over 5,700 frontline nurse leaders, revealed that only 10% of hospital and healthcare leaders believed that new graduate nurses are competent to provide safe, effective nursing care. This is especially remarkable when compared with academic nursing leaders, 90% of whom believe that graduates are competent (Berkow, Virkstis, Stewart, & Conway, 2011). The survey asked leaders to rate new graduates on 36 competencies which were determined to be essential for safe and effective nursing care.
These competencies were bundled into six categories, one of which was critical thinking. In the critical thinking category, the percentage of nurse leaders who were satisfied with new grad proficiency was 25%, even among those working with primarily BSN graduates. The alarming gap between the perceptions of nurse leaders in the academic and practice divisions is concerning, and highlights the challenge of better bridging the education/practice gap.

A qualitative study by Myers et al. (2010) explored the safety concerns of new graduate nurses and their preceptors in an acute care setting. The practice of nursing is complex and fast-paced, placing increasing demands on nurses to keep their patients safe. The environment is often stressful, and new graduates are especially vulnerable to the pressures, which can contribute to dissatisfaction and high turnover rates. This study demonstrated how both new nurses and their preceptors view the learning needs of new graduates and their effect on patient safety. Critical thinking was one of the three most important learning needs identified by both groups. Understanding these learning needs will inform nursing education, both in academia and practice settings. Preparing nursing students to provide safe patient care in an ever-changing environment must include teaching and assessing critical thinking skills throughout the program.

**Clinical judgment assessment.** Clinical judgment is an essential component of safe nursing practice and critical for making patient care decisions and for positive patient outcomes (Lasater, 2011). Nurses use clinical judgment in all aspects of patient care. They must be able to identify changes in patient condition, interpret and intervene appropriately, evaluate interventions, and prioritize care. One tool developed to measure the clinical judgment and critical thinking of nurses is the Performance Based
Development System (PBDS). This tool is based on Patricia Benner’s Novice to Expert Model and its reliability and validity have been established in multiple studies. The PBDS assesses the ability of nurses to respond appropriately to vignettes depicting patient deterioration, allowing assessment of clinical judgment upon which to base an individualized orientation plan.

A retrospective study by Fero et al. (2009) examined the results of PBDS testing in over 2,700 newly hired nurses in a single university health care system over three years. They found that almost 25% of newly hired nurses did not meet expectations in clinical judgment. New graduate nurses, regardless of degree attained, had a lower percentage that met expectations (71.5%) compared to nurses with 1-5 years (77.2%), 5-10 years (74.9%), and 10 or more years of experience (81.7%). Of baccalaureate prepared nurses with less than one year of experience, almost 30% did not meet expectations on the PBDS. It is obvious that these findings have implications not only for nurse managers, educators, and preceptors in the hospital environment, but for faculty in pre-licensure nursing education.

Models of clinical judgment. Clinical judgment was the subject of a literature review by Tanner (2006). Although this reference is dated, it is the classic reference outlining the Clinical Judgment Model that forms the theoretical framework for this present research study. This review of nearly 200 studies found that clinical judgment cannot be viewed merely as a problem-solving strategy as part of the nursing process; it is a much broader concept. Based on her research, Tanner developed a new model of clinical judgment, which has four main aspects: noticing, interpreting, responding, and reflecting. The model is useful as a tool to describe expert nursing judgment and also as
a teaching and assessment tool for novice nurses and nursing students. Tanner (2006) asserts that students must learn to “think like a nurse” to be able to provide safe care for their patients, and her model describes this phenomenon. This model is discussed in depth under the conceptual framework for this study.

Another model that has been used to successfully guide the teaching and evaluation of clinical judgment is the Situated Clinical Decision-Making Framework (Gillespie & Paterson, 2009). Although developed for use in nursing education, it has also been used in specialty nursing education with registered nurses to guide the development of clinical judgment in various venues, and is used in evaluation of nurses’ thinking processes in sentinel events (Gillespie, 2010). The Situated Clinical Decision-Making Framework finds its theoretical foundation in Tanner’s Clinical Judgment model and situated learning theory. Tanner’s model contains the same essential aspects as this framework: noticing, interpreting, responding, and reflecting. Although the concepts are similar, one is labeled clinical judgment, and the other clinical decision-making, emphasizing the ambiguity of terms that exists in nursing literature. Situated learning theory espouses that learning is social and is context-dependent. New graduate nurses practice as novices in the community of professional nursing, with more experienced nurses as mentors and resources.

The Situated Clinical Decision-Making Framework places emphasis on the specific knowledge, thinking processes, and decision-making process in the context in which they are used. This context includes the nurse-patient relationship, the institution or unit, and the greater context of society and the nursing profession. The framework outlines five areas of knowing, which implies active engagement by the nurse.
The first area is knowing the profession. This includes competencies and an understanding of roles, standards of care, and scope of practice. The second area is knowing self, which includes acknowledging one’s strengths, weaknesses, limitations, values, and beliefs. The third area is knowing the case or general aspects of the patient population. This would include pathophysiology, typical presentation, complications, and interventions. The fourth area is knowing the patient. This type of knowing focuses on this particular patient’s problem at this present time, their baseline, and their usual patterns of responding. The fifth area of knowing is the person. This means having an understanding of the patient’s past health and illness experiences, personal responses, preferences, and support systems (Gillespie & Paterson, 2009). Finally, the framework delineates four aspects of clinical decision-making: cues, judgments, decisions, and evaluation of outcomes. These four aspects roughly equal the four aspects of Tanner’s Clinical Judgment model.

For nursing faculty, this framework makes visible the components of clinical decision-making, creating a process that can be used to help nursing students to understand the complexity that is involved in professional nursing practice. It can help to guide nursing students in making clinical decisions that use their existing knowledge base within the complicated context of patient care. This framework also provides faculty with a tool for evaluating specific areas of student strengths and weaknesses.

Educational Strategies for Fostering Clinical Judgment

**Human patient simulation.** A major role of nursing educators is to facilitate learning and evaluation of competencies which nursing students need to be prepared for professional practice. This includes the core concepts of critical thinking and clinical
reasoning, which the AACN (2008) depicts as essential for the nursing process and management of the care of both individual patients and populations. Teaching critical thinking and clinical judgment in a classroom setting is essential, but there exists a gap between what students learn in school and their practice at the bedside as nurses. Simulation may be a strategy to help bridge the gap between critical thinking in the classroom and the clinical setting. Cant and Cooper (2010) conducted a systematic review of the quantitative evidence comparing outcomes of the use of human patient simulation (HPS) in education with other teaching methods. The focus was on medium to high-fidelity simulation studies from 1999-2009 using experimental or quasi-experimental methods. Twelve studies met the criteria. Of these 12 studies, 100% found simulation to be a valid teaching and learning tool. Fifty percent of the studies demonstrated statistically significant increases in knowledge and critical thinking ability in the intervention groups. One limitation of this review was that of the 11 studies that measured critical thinking outcomes, there was no standardized evaluation tool, and some of the tools which were used had not been validated. Also, instead of directly measuring critical thinking, some of the studies used a proxy such as students’ self-reported confidence in making clinical judgments, which brings into question the reliability of their outcomes. The need for continued, rigorous, quantitative research with adequate numbers of subjects to demonstrate outcomes is evident from this review.

A more recent review of the literature by Shinnick, Woo, and Mentes (2011) examined the current state of HPS use in prelicensure nursing education, but arrived at a different conclusion. This study specifically looked at quantitative studies with greater than 10 subjects demonstrating outcomes of simulation use, one of which was critical
thinking. One hundred thirty-five studies met the criteria. It is posited that HPS improves critical thinking skills by actively engaging students and increasing self-efficacy. Critical thinking is one of the outcomes measured in Jeffries’ nursing education simulation framework (Jeffries & Rogers, 2007). However, the paucity of adequately sized quantitative research to support these claims is apparent. The weakness of this review lies in the fact that they only included studies with greater than 10 participants, labeling others “underpowered”. For this reason, they excluded a large number of smaller studies that do show gains in critical thinking and clinical judgment.

Another literature review by Brewer (2011) examined successful strategies for using simulation in nursing education. Ten studies met the criteria of research exploring effective teaching strategies for nursing students using simulation, and that included an analysis of the results. Findings of the review supported the use of human patient simulation as a successful tool for engaging nursing students in critical thinking skills, problem solving, and the use of clinical judgment. The review concluded that allowing the student to make mistakes in the safe environment of the simulation lab facilitates development of these skills. It also identified the debriefing period as being essential, allowing faculty to guide the students in reflection on the situation and their behavior. According to Tanner (2006), reflection is essential to the development and use of clinical judgment.

HPS holds promise as an effective teaching and learning tool, therefore Brewer (2011) makes strong recommendations, based on the evidence, to guide the use of HPS in nursing education. Successful strategies include requiring students to prepare before their SCE by completing pre-assignments, promoting realism to the greatest extent possible,
having students work in groups to promote teamwork and collaboration, and minimizing faculty involvement during the SCE. Other important recommendations were to plan the SCE to correlate with course content, to integrate changes in patient status and giving handoff report, and to use a standardized checklist or rubric to maximize objectivity in evaluation. HPS has great potential to facilitate the development of critical thinking and clinical judgment in nursing students. The literature provides guidance for best practice in its integration into the baccalaureate nursing curriculum.

**Problem-based learning.** Problem-based learning is a learner-centered educational method that uses realistic scenarios to guide the learning process through collaborative problem solving, either individually or in groups. In this method, learning begins with the problem. Students must seek out relevant data and construct their own knowledge through the problem solving process. The problem-based learning process has been shown to promote accountability, independence, and metacognition, as students explore the problem in the context of their future profession (Nilsson & Silén, 2010). Problem-based learning is based on constructivist theory, which states that learners build their own knowledge through experiences, thus encouraging independence and creating lifelong learners. It emphasizes the importance of social interaction in learning (Brandon & All, 2010). In problem-based learning the teacher is viewed not as a lecturer, but as a facilitator of learning (Oja, 2011).

Since a systematic review of the effect of problem-based learning strategies on critical thinking was published in 2009, the review by Oja (2011) used the earlier review as a foundation, including only articles published since the last review. Criteria for inclusion were any study which used problem-based learning as a strategy and that
measured critical thinking outcomes. The result was a total of five studies in addition to the systematic review. Results of the earlier systematic review by Yuan, Williams, and Fan, (2008) found that problem-based learning was linked to the promotion of critical thinking in nursing students. However, there was a lack of strong evidence to support this link because the studies lacked adequate size, were not experimental, and used differing definitions and measurement of critical thinking (Oja, 2011). The additional five studies included one descriptive, two experimental, and two quasi-experimental studies.

All of these studies except for one demonstrated a significant positive correlation between problem-based learning and critical thinking. Various tools were used to measure outcomes, including the Watson-Glaser Critical Thinking Appraisal (WGCTA), California Critical Thinking Skills Test (CCTST), California Critical Thinking Dispositions Inventory (CCTDI), and a graded care plan assignment. All of these tools, with the exception of the care plans, are tools shown to be reliable and valid in measuring critical thinking.

A descriptive study by Ozturk, Muslu, and Dicle (2008) examined the effects of a problem-based learning model on the critical thinking dispositions of nursing students compared to a traditional, content-based model at two university schools of nursing. The convenience sample included 147 fourth-year nursing students. The two groups were demographically homogeneous. Results of the CCTDI demonstrated statistically significant higher scores in the problem–based learning school students in total score, truth-seeking, and open-mindedness.
The authors concluded that the problem-based learning model with its active learning strategies does enhance critical thinking. Their conclusion supports previous findings about problem-based learning. Limitations to this study include a difference in response rate between the two schools, use of a convenience sample, and use of the CCTDI alone. The CCTDI measures the affective dimension of critical thinking by the use of self-reporting instead of using an objective measure of critical thinking skills, such as the CCTST or WGCTA.

**Case studies.** The case study is one problem-based learning activity that has been used extensively in nursing education. A literature review by Popil (2011) examined the effect of using case studies as a learning strategy on the critical thinking skills of nursing students. The use of case studies is a method of learner-centered, experiential learning activity. This method has been used to facilitate learning in a wide variety of nursing subjects, and has been shown to promote critical thinking. Based on real life scenarios, they can be used to expose students to situations they normally would not have experience with, allowing them to develop the ability to think critically in a wider variety of situations. This review demonstrated the positive impact of case studies on nursing students’ critical thinking, which will help prepare them for problem-solving and decision-making in professional practice. Case studies also facilitate the student’s application of knowledge to the clinical setting and linking of theory to practice. Limitations of this study were that the inclusion criteria for this review were not made clear. Also, the number of articles that met the criteria was not identified in the article.

**Concept-based curriculum.** There is a national trend in nursing education to move from curriculum that is content-focused toward one that is concept-based. It is
necessary to move past a content-based curriculum due to a number of factors. First, there is simply too much content in nursing to cover everything within a four-year length of study. Focusing on content is teacher-centered and may lead to information overload and rote learning. A concept-based curriculum is learner-centered, and teaches critical thinking skills instead of memorization. It also avoids the boundaries created through setting-based or population-based teaching. Concept-based teaching facilitates the transfer of knowledge from the classroom to the clinical setting (Giddens et al., 2008). Giddens, Wright, and Gray (2012) posited that utilizing a concept-based curriculum helps students think conceptually and to develop higher level thinking skills.

**Framework.** One concept-based curricular framework that has been developed is the Competency Outcomes and Performance Assessment Model (COPA) (Lenburg, Klein, Abdur-Rahman, Spencer, & Boyer, 2009). This model identifies eight core competencies for nursing education with a focus on quality, safety, and preparation for professional practice. These competencies are practice-oriented, integrated throughout the curriculum, and are the basis for evaluation through the use of high stakes performance examinations. The COPA model identifies critical thinking as one of these core competencies, and essential for students in preparation for safe nursing practice.

For each core competency in the COPA model, the authors have given examples of cognitive, affective, and psychomotor skills that are related to the competency. These skills can be used in teaching and evaluating these concepts. Examples of skills related to the critical thinking competency include data collection and evaluation, integration of theory within practice, clinical reasoning, decision making, priority setting, and anticipating problems. Use of the COPA framework provides objective outcomes data
that will facilitate the development, implementation, and evaluation of the critical thinking competency within a concept-based curriculum.

**Benchmarks for curriculum development.** One study examined the core concepts used by ten nursing schools with concept-based curriculum in order to provide a benchmark to guide curriculum development (Giddens et al., 2012). Their descriptive study surveyed ten nursing schools (seven BSN, three ADN) which used concept-based curriculum to explore the most common concepts addressed. Of the 104 total concepts listed by the schools, 54 were present on greater than half of the curricula, and thus were identified as benchmark concepts. The concept of critical thinking/clinical judgment was included in 86% of the BSN curricula, 66% of the ADN, and 80% overall. It was one of the 14 most commonly identified concepts. Though the study does not recommend which concepts to include in curricula, it reflects the importance placed on these skills by schools of nursing and provides a benchmark for selecting critical thinking and clinical judgment as essential concepts for inclusion in the concept-based curriculum.

**Concept-based learning activities.** A study by Lasater and Nielsen (2009) examined the use of concept-based learning activities as an educational strategy to facilitate the growth of critical thinking and clinical judgment. This was a quasi-experimental, mixed method study of junior nursing students in a baccalaureate program that teaches concept-based nursing. The study employed learning activities to help integrate those concepts into the clinical experience. These activities, built on the framework of Tanner’s Clinical Judgment Model, incorporated study guides used to help students prepare for and reflect on their clinical experience. The activities included pre-clinical study, concept-based guides for nursing assessment, and focused reflection both
in action and on action. The clinical day culminated in the students meeting for “grand rounds” on all of their patients. These rounds were student led and faculty facilitated. The intervention group used these activities to enrich their clinical experience while the control group used the standard teaching.

For the quantitative portion of this study, outcomes were measured using the Lasater Clinical Judgment Rubric (LCJR) in simulation to measure clinical judgment scores. Analysis showed that the intervention group scored statistically higher than the control group, indicating the impact of the concept-based learning activities. The qualitative portion of the study examined responses to the concept-based learning activities in a focus group. The responses were positive, citing several areas in which the activities increased their learning in clinical experiences. These outcomes validate the effect of using concept-based learning activities to help promote the development of clinical judgment. Limitations of this study were the small sample size (28 students) and convenience sampling.

**Concept mapping.** Another educational strategy that has been studied in teaching critical thinking and clinical judgment is concept mapping. Concept mapping was developed by Novak as a strategy to promote critical thinking, based on the assimilation theory of learning (Vacek, 2009). Assimilation theory states that meaningful learning occurs when students consciously link new knowledge to existing knowledge, facilitating understanding. Concept mapping actively engages students in the learning process through diagramming concepts and their relationships, providing a structure to guide their thinking as they incorporate new concepts into their existing foundation of knowledge and experience. A drawback to using concept mapping is that it requires
student and faculty orientation to this tool, and student use in the clinical setting can be time-consuming.

The effect of concept mapping on clinical judgment was the subject of a small qualitative study by Gerdeman, Lux, and Jacko (2013). The authors cited assimilation theory and constructivism as the foundation for their study. Constructivism posits that learning is constructed by the student through problem-solving and reflection. Concept mapping facilitates the students’ construction of new knowledge and understanding by making the conceptual linkages of the nursing process more visible. This new knowledge can provide a basis for strong clinical judgment skills. For this investigation, the authors developed a Clinical Judgment Self-Evaluation Rubric based on Tanner’s Clinical Judgment model. The purpose of this tool was to allow students to reflect on their thought process and evaluate their own use of the four aspects of clinical judgment in the construction of their concept maps.

In their study, eight junior baccalaureate nursing students completed concept maps for six weeks based on their clinical experiences, using the Clinical Judgment Self-Evaluation Rubric as a guide. Upon completion of this work, the students evaluated the effect of the rubric in group discussions. The majority of students reported that the exercise increased their ability to prioritize, synthesize, interpret data, and anticipate interventions. They also reported improvement in confidence, communication, and teambuilding skills. The authors concluded that use of the Clinical Judgment Self-Evaluation Rubric to guide concept mapping provided guidance in the development of clinical judgment. However, the authors also noted that if not properly taught, concept-
mapping can be a barrier to learning. The small size of the sample and the subjective nature of this study limit its generalizability.

Another study examined the long-term effect of concept-mapping on critical thinking. This quasi-experimental, longitudinal study used purposive sampling to select 95 baccalaureate nursing students at one university in Taiwan. The experimental group learned and used concept-mapping during the medical-surgical course, while the control group used traditional care planning in their assignments. Critical thinking was measured at four different times over two years using the Critical Thinking Scale (CTS), which has been shown to be a valid and reliable tool for measuring critical thinking skills. Statistically significant findings include higher scores in inference and deduction as well as a greater rate of growth in CTS scores over time. This study demonstrates the positive effect that concept-mapping can have on the critical thinking skills of nursing students, and that these changes persist over time (Lee et al., 2013). Limitations of this study are that it used convenience sampling, and the CTS assessment uses self-reported scales, which limits the objectivity of the data.

**Reflection.** According to Tanner’s model of clinical judgment, reflection is an essential aspect of the process. Teaching nursing students to use reflection is a tool that has been used to encourage the development of critical thinking skills. One recent study explored the use of guided reflection through journaling versus the standard development of a care plan for the post-clinical assignment. The goal of this qualitative study was to compare the effect of these two teaching tools on the students’ perceived (1) levels of confidence in using critical thinking skills and (2) differences in the effect of the two tools on promoting and using their critical thinking abilities (Marchigiano, Eduljee, &
The basis for the guided reflection journaling assignment was the cognitive areas and skills of Facione’s (1990) critical thinking framework, used in conjunction with the nursing process. Outcomes were measured using a tool designed by the investigator, which asked students to rate their confidence in seven areas of critical thinking when using either the journaling or care plan format.

Results of the study showed that students who completed the reflective journal were significantly more confident in their ability to analyze, identify and select relevant information, make connections, apply existing knowledge, and evaluate patient outcomes. The journal took about half the amount of time to complete than the care plan, which may indicate that it is a more efficient way to learn the same information. Limitations include the small sample size (n=51), homogeneity of the group, and use of an investigator–created, subjective instrument to measure outcomes. Although this study would have been stronger if it had used an additional, objective measure of critical thinking, it is important to note that confidence in clinical skills is important to success in nursing, especially for new graduate RNs (Beyea, von Reyn, & Slattery, 2007).

A more recent study by Naber and Wyatt (2013) also examined the effect of reflective writing on critical thinking. This randomized controlled trial used Paul’s critical thinking model as its conceptual framework. Paul’s model of critical thinking has been used as a framework to teach critical thinking and for the design of learner-centered activities to improve critical thinking skills. The authors used the CCTST and CCTDI for pre- and post-testing, to measure both critical thinking skills and disposition of 70 junior baccalaureate nursing students. The intervention was a series of six reflective writing assignments, given during the course of the semester.
Although there was not a significant difference in total posttest scores between the experimental and control groups, there was a significant increase in the subscale of truth seeking in the experimental group. Truth seeking is an essential element of critical thinking, indicating increased eagerness, honesty, and courage in seeking out the truth, important characteristics for professional nurses. Limitations of this study may be related to the short time between pre- and post-testing and the frequency of intervention. The authors concluded that measurable improvements in critical thinking may require either a longer timeframe or increased frequency of intervention, or both.

**Evaluation of clinical judgment.** Clinical judgment has been called the “last frontier for evaluation” (Lasater, 2011, p. 86). Nursing faculty face challenges in evaluating clinical judgment development in nursing students. The Lasater Clinical Judgment Rubric (LCJR) was designed to address this challenge. It is an evidence-based rubric which is based on Tanner’s interpretive model of clinical judgment, and incorporates the four pillars of noticing, interpreting, responding, and reflecting Lasater (2006). The LCJR is a tool which can be used to both teach and evaluate clinical judgment in practice or in a simulated environment. It provides a common language for both students and educators and a standard by which to measure clinical judgment development. Evidence supports the use of this rubric to assess clinical judgment in simulation. The rubric may be used formatively or summatively. Three independent research studies using three different methods has shown the LCJR to be a valid and reliable tool for evaluating clinical judgment using human patient simulation (Adamson, Gubrud, Sideras, & Lasater, 2012). Interrater reliability results of the first two studies were between 89% and 96%, indicating a high amount of reliability. The rubric has also
been used to provide feedback for reflective journals and a means for self-evaluation in addition to being used as a guide for formulating higher level thought questions to shape students’ thinking like a nurse (Lasater, 2011). The LCJR is discussed in more detail in the next chapter.

**Faculty competency.** One challenge facing educators is ensuring that faculty are prepared to teach the concepts of critical thinking and clinical judgment to their students. One university school of nursing sought to integrate simulation as a tool to teach and evaluate clinical judgment in nursing students (Su & Juestel, 2010). Simulation has been shown to contribute to the development of clinical judgment, but faculty who facilitate learning through simulation must acquire new skills. They must develop the ability to help students make connections between the classroom, simulation, and clinical practice. Faculty are also called upon to evaluate clinical judgment in simulation scenarios. To implement these changes requires not only new skills, but a framework on which to build. This study used Tanner’s Clinical Judgment Model as the middle range theory on which these curricular changes were based.

Even though simulation has been shown to be an effective tool in development of critical thinking and clinical judgment skills, novice faculty are often inexperienced in its use for teaching these concepts. One study sought to operationalize their critical thinking objectives through the use of tools that would support novice faculty working with nursing students in the simulation lab. A strategy of mentoring with expert faculty and the provision of novice faculty with core questions to guide simulation and debriefing was found to facilitate learning of both students and new faculty. Motivated by evidence of the need to model and coach critical thinking prior to the simulation experience, the
classroom format was changed from lecture to case studies, which were directed by faculty and resulted in student engagement in the learning process (Su & Juestel, 2010). This article serves to remind educators that teaching critical thinking and clinical judgment may require new teaching and learning strategies.

**Gaps in the Literature**

It is evident from an examination of the nursing literature that the use of the terms critical thinking, clinical reasoning, clinical judgment, and other related terms remains ambiguous. The nursing profession must move to standardize use of these terms in education, practice, and research to facilitate the education and evaluation of these skills. It is also evident that there is a continued need for rigorous quantitative research in the areas of critical thinking and clinical judgment using adequate sample sizes to strengthen analysis and generalizability (Cant & Cooper, 2010). The majority of the studies exploring educational strategies are qualitative or rely on students’ self-report of confidence and/or improvement in critical thinking and clinical judgment, instead of presenting objective data. Studies such as these are difficult to make inferences from and limit their usefulness in furthering knowledge of these concepts in nursing education (Shinnick et al., 2011).

Along with the need for research to promote conceptual consistency among educators and further evaluation of learning strategies, a recent systematic review of critical thinking in nursing education revealed the need for further research into the factors which influence the development of critical thinking abilities in nursing students (Chan, 2013). These factors include those related to students, faculty, system, and environment, all of which are crucial to the facilitation of learning critical thinking skills.
A recent study by Hunter, Pitt, Croce, and Roche (2013) further emphasized the need for research into factors influencing the development of critical thinking in nursing students. Their cross-sectional, descriptive study examined student factors which predict critical thinking skills. The study identified three positive predictors of critical thinking abilities; year of study, nursing-related experience, and nationality. However, these variables were only related to a small variance in the outcomes. This led the authors to believe that there are other predictors which have yet to be explored, and to recommend that further research into this subject be conducted.

**Theoretical/Conceptual Framework**

An important role for advanced practice nurses is that of integrating middle-range nursing theories into practice (Butts & Rich, 2011). This is true in nursing education as well as in other forms of nursing practice. The goal of this present study was to test applicability of a middle-range theory, the Developing Nurses’ Thinking (DNT) Model. This was done by using the model as an educational tool with an intervention group of senior nursing students and evaluating its effects on clinical judgment in simulation as measured by Lasater’s Clinical Judgment Rubric (LCJR). The DNT Model has recently been introduced and preliminary testing shows positive effects on clinical reasoning in nursing students, but there is need for further validation of this model using further indicators of desired outcomes. The purpose of this study was to continue to explore the usefulness of the DNT Model as a tool to promote the development of critical thinking and clinical judgment in pre-licensure nursing students.
Clinical Judgment Model

Tanner (2006) published an article proclaiming a new model of clinical judgment in nursing, which described “thinking like a nurse…a form of engaged moral reasoning” (p. 209). Her model represented a radical departure from the existing model, which was a problem-solving, nursing process-based, simplistic model. Her theory was evidence-based, built on an extensive review of over 200 research articles, and reflected the complexity of clinical judgment in practice (Tanner, 2006).

Because nursing literature used many terms interchangeably with clinical judgment, Tanner began by clarifying definitions of the major terms used in her work. Based on the literature, Tanner defined clinical judgment as, “an interpretation or conclusion about a patient’s needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p. 204). Tanner viewed clinical judgment as complex and encompassing many ways of thinking and types of knowledge. Clinical reasoning was seen as an essential component of clinical judgment. It was defined as, “the processes by which nurses and other clinicians make their judgments…” (p. 204).

This literature review yielded five main conclusions about clinical judgment, which are used by Tanner (2006) as the foundation for the Clinical Judgment Model. The first conclusion is that the nurse’s beliefs, values, knowledge, and experience have more impact on clinical judgment than objective patient data. It is affected by textbook knowledge and coupled with the experience of application in the clinical setting. More experienced nurses are able to draw more quickly on their practical knowledge and
intuition. Less experienced nurses must take time to analyze the situation, making connections to previous learning and reasoning through possibilities.

The second conclusion is that knowing the patient contributes to good clinical judgment and allows for individualized care. The concept of knowing includes both knowledge of the patient’s typical responses and knowing him as a person, which leads to engagement. The third conclusion was that nursing judgment was strongly influenced by the context in which it takes place. The context may include variables such as unit workflow, interdisciplinary relationships, political climate, moral values, and organizational culture. All of these factors influence the judgments nurses make, and reinforce the finding of Benner, et al. (2009) that nursing knowledge is “socially imbedded” (p. 206).

The fourth conclusion that was drawn from the nursing literature was that experienced nurses utilize multiple types of reasoning, depending on the patient’s situation, the nurse’s understanding of the problem, and the nurse’s goals. The first type of reasoning used is analytical. Analytical processes systematically deconstruct problems to form deductions, generate alternatives, and choose the best option available. The nursing process fits into this category. The second type of reasoning is intuition, an immediate grasp of the overall situation. Intuition is derived from experience and is related to pattern recognition. The third is narrative thinking, which uses storytelling to interpret, explain, and define experiences. These three types of reasoning may be used alone or in combination with other types, depending on the nurse and the situation. The fifth conclusion is that reflection on practice is often prompted by failures of clinical
judgment, and can increase experiential learning, expand knowledge, and improve judgment (Tanner, 2006).

Based on these five conclusions from the literature, Tanner constructed her Clinical Judgment Model (Figure 1). The model represents an iterative process that has four main aspects: Noticing, Interpreting, Responding, and Reflecting. These four aspects are situated in the context, background, and relationship, reflecting the social embeddedness of the process. Noticing, the first aspect of the model, is the nurse’s grasp of the situation, and is based on expectations influenced by the context of the situation, not necessarily on the nursing assessment. The second aspect is Interpreting, which employs one or more of the reasoning patterns discussed above, depending on the situation and the nurse’s experience and knowledge.
Interpreting leads to Responding, the decision whether or not to intervene, and what action to take. The last aspect, Reflection, is made up of two equally important components. The first, reflection-in-action, refers to the nurse observing the response of the patient to the intervention and making adjustments accordingly. Reflecting-on-action occurs when the nurse thinks back on the situation and learns from it. The Tanner Clinical Judgment Model defines the process of thinking like a nurse and provides a common language to use in teaching and evaluating clinical judgment, both for nursing students and for nurses in professional practice.

Tanner’s Clinical Judgment Model formed the conceptual framework for this capstone project. The DNT Model fits well with Tanner’s first and fourth conclusions about clinical judgment. The first conclusion is that clinical judgment is largely influenced by the nurse’s beliefs, values, knowledge, and experience. Tanner noted that
nurses with less experience must draw on previous learning, taking time to analyze, reflect, and reason through the situation. Tanner also concluded that although experienced nurses use a variety of ways of thinking, beginning nurses primarily use analytical processes when confronted with a complex or unfamiliar situation. The DNT Model provides explicit application of critical thinking skills to the nursing process, which promotes the development of effective ways of thinking in clinical reasoning and judgment. The use of this model also aligns with Benner’s description of the novice nurse, who depends on rules to guide the formulation of conclusions and decision-making regarding how to act (Benner et al., 2009). The DNT Model helps student nurses to think analytically, providing them with tools that can promote the development of clinical judgment in practice. Based on the propositions of Tanner, this intervention should positively affect the clinical judgment of nursing students in simulation.

An experimental research design was appropriate to test the effect of applying the DNT Model on clinical judgment. A pretest/posttest design was used to determine growth in clinical judgment, using Tanner’s four aspects of Noticing, Interpreting, Responding, and Reflecting as the empirical outcomes of interest. The LCJR was utilized to measure the effect of the DNT Model on the clinical judgment of nursing students by evaluating their performance in SCE. This rubric was an appropriate instrument for this study since it describes behaviors that indicate understanding of the four aspects of clinical judgment, allowing for objective evaluation of performance.
**Developing Nurses’ Thinking Model**

Dr. Tanner’s work on clinical judgment influenced Dr. Tesoro in the creation of The Developing Nurses’ Thinking (DNT) Model (2012). In response to the AACN’s call for transformation of baccalaureate nursing education to advance patient safety and quality nursing care, Tesoro, a nurse educator, designed and tested the DNT Model as a tool for teaching prelicensure nursing students to “think like nurses” in situations requiring the use of clinical reasoning and judgment (p. 438). Sternberg’s theory of Human Intelligence formed the foundation for the model. Sternberg posited that intelligence is made up of three abilities: analytical, creative, and practical, with three components; internal, experience, and external (Huitt, 2002). The internal component includes the processes of executive functions, performance knowledge, and learning acquisition. The external component includes the processes one uses to either adapt or change the environment, or to choose a new one. The experience component deals with being able to learn and think within new systems and the ability to perform complex thought processes automatically because of much practice. These three components of intelligence form the framework for the DNT Model. The main constructs of the model are as follows: The external component is the context of patient safety. The internal components of interest are nursing specific (domain) knowledge and critical thinking processes and the experiential component is accomplished through the students’ repeated use of the model in clinical problem-solving (Tesoro, 2012).

Because of the complexity of the processes involved in exercising clinical judgment, the DNT Model was created for use as a map to guide students in the use of critical thinking processes in reasoning through the nursing process in patient situations.
Tesoro posited that patient safety is directly affected by the nurse’s ability to accurately identify the nursing diagnosis using the nursing process, which is essential to planning, interventions, and evaluation to meet patient needs. She also cited studies that demonstrated the positive effect of critical thinking and domain knowledge on the nursing process and patient outcomes as pertinent to her research. Tesoro utilized findings from the Delphi study on critical thinking in nursing by Scheffer and Rubenfeld (2000) to define the seven cognitive skills and ten attitudes that she used in her DNT Model (Appendix B) and accompanying worksheet (Appendix C).

Tesoro’s DNT Model provides a framework to help students apply critical thinking principles to the nursing process. The seven cognitive skills which are utilized in this model are: analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge. The ten attitudes used are: confidence, contextual perspective, creativity, flexibility, intellectual integrity, inquisitiveness, intuition/pattern recognition, open-mindedness, perseverance, and reflection. These skills and attitudes, along with a short explanation of each, were integrated into the DNT worksheet which was used as a teaching tool for the intervention. This worksheet was provided by Dr. Tesoro for use in this study.

In her quasi-experimental study, Tesoro demonstrated that the DNT Model positively affects development of critical thinking and clinical judgment. Her study took place during the students’ first clinical course. The convenience sample was randomly assigned to either the control or intervention group at two different baccalaureate nursing schools (n = 83). The intervention group received instruction using the DNT Model during two clinical post-conferences, while the control group had the standard post-
conference format, using the nursing process to address patient problems. The pre- and posttests were case studies, and the outcome measured was accuracy of the nursing diagnosis.

Pretest scores and demographics were examined for both groups at both schools, and it was determined that there were no statistically significant differences between the two groups. Therefore, data was combined for statistical analysis (Tesoro, 2012). For accuracy of nursing diagnosis on the posttests, the mean score was statistically significantly higher for the intervention group ($M = 3.58$), compared with the control group ($M = 2.68$).

Also, comparison of pre- and posttest scores for each student revealed that there was no statistically significant change in the control group ($M = 0.12$, $SD = 1.85$, $p = 0.691$), but the intervention group showed a statistically significant increase ($M = 0.99$, $SD = 1.89$, $p = 0.01$) (Tesoro, 2012). In conclusion, Tesoro’s hypothesis that using the DNT Model would enhance critical thinking and clinical judgment was supported. The intervention improved nursing students’ accuracy in making a nursing diagnosis as compared with the standard clinical post-conference. Because this model has been shown to positively affect clinical reasoning in this study, it is important to test the DNT Model for further application within nursing education. The purpose of this capstone project was to continue examination of its effect, not on diagnostic accuracy, but on the more complex concept of clinical judgment.

**Learning Theory**

In addition to defining the conceptual framework, because of the nature of this study, consideration must be given to learning theory. Active learning strategies have
been shown to enhance the development of critical thinking in nursing education (Lisko & O’Dell, 2010). Theoretical underpinnings of active learning draw largely from the experiential learning concepts of Dewey and Kolb. Dewey (1997) believed that all genuine learning is a result of personal experience and encouraged teachers to carefully craft experiences to reinforce course content. He believed that observation, combined with knowledge and judgment, are transformed by experience into purpose and direction within the learner. Dewey placed the learner at the center of the educational experience, not the teacher, which was radically opposed to the practice of his day.

David Kolb’s experiential learning theory (ELT) is a constructivist theory, positing that knowledge is created in the learner through the transformation of experience. Key concepts in (ELT) are that learning is a process of creating knowledge in the learner through active engagement and that learning comes through examination and reflection on existing knowledge. According to ELT, learning is a holistic, adaptive process, resulting from the resolution of perceived conflict and interaction with the environment (Kolb & Kolb, 2005). Active learning engages students in problem-solving and decision-making dealing with real life scenarios, and promotes the development of critical thinking and clinical judgment. A review of the literature has demonstrated multiple learning strategies used in encouraging the development of critical thinking and clinical judgment in nursing students. It was noted that all of these studies used active learning strategies; human patient simulation, problem-based learning, and concept-based activities to improve critical thinking abilities.
Summary

Critical thinking and clinical judgment in nursing have been a focus of research for decades. However, standardized use of the terminology has yet to be attained. Until the profession reaches a consensus in this area, it will be difficult to generalize research findings, to teach, and to evaluate these concepts. The significance of critical thinking and clinical judgment to nursing practice is undeniable. Clinical judgment is essential for safe nursing practice, for making sound patient care decisions, and for positive patient outcomes (Lasater, 2011). However, new graduate nurses have been found to lack these abilities as evidenced by outcomes of PBDS testing, which demonstrated that almost 30% of baccalaureate nurses with less than one year of experience met performance expectations (Fero et al., 2009). The study by Berkow, Virkstis, Stewart, & Conway (2011) revealed that only 10% of frontline nurse leaders felt new graduate nurses were able to provide safe, effective patient care, compared with 90% of academic nurse leaders. These findings highlight the gap that exists between nursing education and practice, specifically in the areas of critical thinking and clinical judgment.

Two models of clinical judgment were examined: Tanner’s Clinical Judgment Model and the Situated Clinical Decision-Making Framework. Of interest, although these two models share core concepts, one uses the term clinical judgment and one the term clinical decision-making, demonstrating the lack of standardized terminology. Tanner’s model focuses on the concepts of noticing, interpreting, responding, and reflecting, while the Situated Clinical Decision-Making Framework puts more emphasis on the context in which the process takes place. Both models are useful for teaching and evaluation (Tanner, 2006; Gillespie & Paterson, 2009).
Educational strategies to encourage critical thinking and clinical judgment include simulation, problem based learning, concept-based clinical experiences, concept mapping, the Developing Nurses’ Thinking model, and reflection. All of these strategies have been the subject of research, but there remains a need for continued testing of theories, especially using large, quantitative studies, which will allow for generalization to a greater population. Evaluation of clinical judgment is a challenge. The Lasater Clinical Judgment Rubric (LCJR) was designed based on Tanner’s model as a means of objectively evaluating the process in nursing students. The rubric was found to be a valid and reliable tool to measure clinical judgment outcomes (Adamson et al., 2012). Another challenge is that of ensuring faculty competence in understanding, teaching, and evaluating critical thinking and clinical judgment. This may require educators to acquire new skills or apply existing skills in new settings such as simulation (Su & Juestel, 2010).

There is an ongoing need to prepare baccalaureate nursing students for safe nursing practice through strengthening their critical thinking and clinical judgment skills. Faculty must be involved, not only in teaching and evaluating critical thinking and clinical judgment, but in research designed to generate and test theories to support best practice. In light of the findings in the literature, ongoing research is needed to come to a consensus on use of terminology in nursing, and to test educational models and strategies to encourage critical thinking and clinical judgment.

The conceptual framework for this study is Tanner’s (2006) Clinical Judgment model. Thinking like a nurse is a process that is affected by the context in which it takes place, and consists of the four aspects of noticing, interpreting, responding, and reflecting. The middle-range theory being tested is Tesoro’s Developing Nurses’
Thinking (DNT) model. The four constructs of this model are the patient safety context, domain knowledge, critical thinking skills, and learning by experience. Outcomes were measured using the Lasater Clinical Judgment rubric in a simulated patient experience. This rubric was designed based on Tanner’s model, and has been found to be valid and reliable as a tool to measure clinical judgment. This quantitative study of the effects of the DNT Model on the clinical judgment of senior nursing students has contributed to the nursing profession by testing the effect of this middle-range theory on the clinical judgment of nursing students. Using the LCJR to measure clinical judgment outcomes in simulation better reflects the student’s ability to use their critical thinking skills to assess, interpret, intervene, and evaluate patient problems.
CHAPTER III

Project Description

Critical thinking and clinical judgment are essential competencies for professional nursing practice. It is the responsibility of baccalaureate programs to prepare nursing students to function competently upon graduation, using the nursing process appropriately to provide care which is safe, high quality, and patient-centered (AACN, 2008). Critical thinking and clinical reasoning form the foundation for nursing judgment and are used continually in nursing practice. The challenge that faces baccalaureate nursing programs is how best to facilitate the development of these skills in our students. Nursing educators need to continue to develop evidence for best practice and test the effectiveness of educational strategies that promote this goal, so that the learning needs of nursing students are met and graduates of baccalaureate programs are adequately equipped to provide quality health care, not only in our society, but across the globe.

This chapter provides an overview of the methodology that was used in the study on The Effect of the Developing Nurses’ Thinking (DNT) Model on Clinical Judgment in Nursing Students. The purpose of this capstone project was to research the question, how does the DNT Model affect nursing students’ clinical judgment? To answer this question an experimental study was conducted to test the middle-range theory of the Developing Nurses’ Thinking (DNT) Model. First semester senior nursing students were randomly assigned to either the intervention or control group. The intervention consisted of using the DNT Model as a teaching tool in clinical post-conferences. The control group continued with the standard clinical post-conferences. Pre- and post-intervention testing
measured outcomes in simulated clinical experiences (SCE) using the Lasater Clinical Judgment Rubric (LCJR).

**Setting and Sample**

The setting for this study was a baccalaureate degree school of nursing in a faith-based university in the southeastern United States. This study fit well with the university’s Quality Enhancement Plan, which is Christ-centered critical thinking. The plan focuses on promoting a Christ-centered worldview and on improving critical thinking skills across the university. The participants in this project were a convenience sample of 44 nursing students in the first semester of their senior year of a baccalaureate degree nursing program. These students were enrolled in the Nursing Practice IV/Adult Health I course, an eight semester hour course which consisted of four hours of class and 12 hours of clinical weekly.

**Project Design**

An experimental, pretest/ posttest, quantitative research design was used in this study. The experimental design was appropriate for this study which sought to test a predictive middle-range theory. The question asked in this study was, how does the DNT Model affect nursing students’ clinical judgment in simulation? The independent variable was use of the DNT Model in clinical post-conferences. The dependent variable was the difference between pre- and post-intervention scores on the LCJR. Comparisons were made between the intervention and control groups. The nursing students were randomly assigned to clinical groups as a part of their Nursing Practice IV/Adult Health I course. The intervention was randomly assigned to these existing clinical groups.
The participants were recruited during the first session of the Nursing Practice IV/Adult Health I course. The pretest was administered during the first of three regularly scheduled course-related simulated clinical experiences (SCE). The pretest is a course requirement, regardless of whether or not the students participated in the study. Students were divided into groups of three to four for the test, which consisted of a commercially available simulation scenario using high fidelity human patient simulation (HFHPS). The scenario depicted an evolving situation concerning a deteriorating patient which required the use of clinical judgment. Student performance during the scenario was evaluated by faculty using the LCJR. Faculty training on use of this tool was provided prior to implementation. To protect their privacy, students were assigned numbers for data analysis and pretest scores were recorded.

Following completion of the pretest by all students, they attended their regularly scheduled 12-hour hospital clinical experiences for two weeks. The students were divided into five clinical groups of eight to nine students each. Three of the groups served as the control group, and the remaining two groups received the intervention, the DNT Model. The DNT Model was used during clinical post conferences with the intervention groups for two consecutive weeks, using the worksheet in Appendix B to guide instruction, discussion, and student application of the model to patient case studies. This model was taught by the researcher. Faculty for the control groups conducted the usual post conference with their students, using the nursing process to analyze patient case studies.

The posttest was conducted following the two weeks of post conferences using the DNT Model with the intervention groups. The posttest followed the same format as
the pretest, but used a different scenario, which again depicted a deteriorating patient and required the use of clinical judgment. When all participants had completed the posttest, they were debriefed about testing of the DNT Model.

**Protection of Human Subjects**

To ensure that students’ rights were protected, approval was secured from the Institutional Review Boards of the University and the study facility prior to implementation of the study. Informed consent was obtained from all interested students, who were informed that the study data would be used for the evaluation of the effectiveness of teaching strategies only, and would not influence their grades for the course. There were no risks associated with this study. Data was secured and de-identified to protect privacy, with only the researcher having access to the data.

**Instruments**

The instrument used to collect data was the LCJR. (Appendix D) Permission was obtained from the author for use in this study. Development of the LCJR was based on research that was prompted by the paucity of tools to measure clinical judgment and by the increased use of simulation in nursing education (Lasater, 2006). The rubric, which was based on the framework of Tanner’s Clinical Judgment Model, describes four varying levels of clinical judgment, from Beginning through Exemplary. Tanner (2006) defines a rubric as an “assessment tool that delineates the expectations for a task or assignment” (p. 497). The purpose of the LCJR is to communicate expectations for behavior for both students and faculty. It provides descriptions of behaviors that indicate understanding of the concepts to allow standardized evaluation of the abstract concepts that make up clinical judgment.
The LCJR identifies and analyzes four advancing levels in the development of clinical judgment using the four aspects of Tanner’s model; Noticing, Interpreting, Responding, and Reflecting (Tanner, 2006). To facilitate evaluation of these four aspects, Lasater’s rubric breaks them down into discrete, observable actions or attitudes. These actions and attitudes form the basis for scoring on the evaluation tool.

Noticing is divided into three elements: focused observation, recognizing deviations from normal, and seeking out information. Interpreting includes two aspects: prioritization and making sense of data. Responding includes communication, development of interventions, and nursing skill performance. Finally, Reflecting involves self-analysis and commitment to improvement.

Each of these four aspects is further described and divided into four developmental levels: Beginner, Developing, Accomplished, and Exemplary. These levels allow assessment of the student’s overall stage of clinical judgment, along with identifying areas of strength and weakness. They also provide an objective means to evaluate progress in clinical judgment over time. Although it was originally designed for use in simulation, it has been used successfully in a variety of healthcare settings.

The LCJR has been the subject of multiple studies assessing its validity and reliability. A recent article by Adamson et al. (2012) summarizes findings of three different research studies which used various methods to evaluate the LCJR for applicability to evaluate behavior in simulated clinical experiences. All three studies showed the LCJR instrument to be valid for use in assessing the level of clinical judgment of nursing students in simulation.
The study by Adamson and Kardong-Edgren (2012) showed that nursing faculty raters were able to identify the level of clinical judgment accurately and consistently with the LCJR. Internal consistency of the instrument, an indicator of the extent to which the items fit the concepts, was measured through the use of Cronbach's alpha, with a result of 0.974. Video recordings of simulation performances were independently rated by 38 nurse educators using three different rubrics to establish interrater reliability, using the intraclass correlation method. The result was an interrater reliability of 0.889. This study also examined test-retest reliability, which measures the stability of an instrument over time. Test-Retest Reliability was measured using Pearson (r), the Spearman rho, and intraclass correlations, with results of .908, .910, and .908, respectively.

The purpose of the Sideras (2007) study was to test construct validity of the LCJR through comparing the clinical judgment performances of graduating senior nursing students to end-of-year juniors using four different raters. The focus was on the ability of these raters to objectively measure the construct of clinical judgment in the simulation setting, using the descriptors in each of the levels of each aspect. This study found that application of the LCJR allowed raters to properly distinguish between levels of clinical judgment, supporting the construct validity of the LCJR, and demonstrating the usefulness of the LCJR as a strong instrument in measuring nursing outcomes. This study also examined interrater reliability and found variability in the levels of accuracy. On initial evaluation, all raters scored greater than 90% agreement. However, over time the level of agreement between rates decreased to 55% and 73%. This was of concern to the researcher, who recommended that further study be done to improve interrater reliability.
The purpose of the Gubrud-Howe (2008) study was to explore the development of clinical judgment in nursing students through the use of high-fidelity simulation. Because it was essential to measurement of the outcomes, the study established the interrater reliability of the LCJR prior to its use in data collection. It found that percentage of agreement ranged from 92-96% (Adamson et al., 2012). The study also found the LCJR to be conceptually valid by showing that students who worked to increase their nursing knowledge demonstrated improved clinical judgment, as indicated by improved scores on the LCJR. In summary, the validity and reliability of the LCJR have been established in multiple quantitative research studies through the use of a variety of methods.

**Data Collection**

Data collected for both the intervention and control groups included basic demographics, previous degrees or experience, experience working in clinical areas, and pre- and posttest scores as measured by the LCJR. The personal data was acquired from the students through an online survey by the researcher during the second week of the semester. One faculty member with expertise in simulation collected pre- and posttest data using the LCJR. This faculty member was trained in the use of the instrument and practiced its use prior to evaluating student simulation performance. Training in content, purpose, and proper use of the tool is essential to interrater reliability when using performance-based evaluation instruments such as the LCJR (Adamson & Kardong-Edgren, 2012).
Data Analysis

Demographic and test score data were entered by the researcher and de-identified. Pretest scores and sample characteristics of the two groups were compared to assure equality of variance prior to test score analysis. Data were statistically analyzed using an independent samples t-test to determine differences in posttest scores between the control and intervention groups. The paired t-test was used to analyze differences between pre- and posttest scores for individual students and within groups.

Timeline

Following IRB approval, the project began in the first weeks of the Fall 2013 semester. An explanation of the study was presented to the students during a regularly scheduled Nursing Practice IV/Adult Health I course and informed consent was obtained from those willing to participate. The pretests were completed during the students’ regularly scheduled SCEs throughout the month of September. Beginning in October, the DNT Model was introduced to the intervention group in two separate post conference meetings, one week apart. Once the intervention was completed, post testing was conducted as each student completed their third SCE of the course. The posttests were completed by the end of November. Demographic and test result data was then given to the statistician for analysis, which was completed in January, 2014.

Summary

The development of clinical judgment is critical for safe, effective nursing practice. Baccalaureate schools of nursing have been charged with enhancing these abilities in nursing students, but finding effective methods to accomplish this remains a challenge for educators. This chapter has provided an overview of the methodology that
was used in the study on the Effect of the Developing Nurses’ Thinking Model on Clinical Judgment in Nursing Students. The purpose of this capstone project was to research the question, how does the DNT Model affect nursing students’ clinical judgment in simulation? This was an experimental study testing the applicability of the middle-range theory of the Developing Nurses’ Thinking (DNT) Model to enhancing clinical judgment in senior nursing students. The randomly selected intervention group was instructed in using the DNT Model as a tool in clinical post-conferences. The control group received the standard clinical post-conferences. Pre- and post-intervention testing measured outcomes in SCEs using the Lasater Clinical Judgment Rubric. Data were analyzed to determine whether the data support the use of the DNT Model as an educational strategy which positively affects clinical judgment scores of nursing students in simulation.
CHAPTER IV

Results

This chapter provides an overview of the results of the study on the Effect of the Developing Nurses’ Thinking (DNT) Model on Clinical Judgment in Nursing Students. The purpose of this capstone project was to research the question, how does the DNT Model affect nursing students’ clinical judgment in simulation? To answer this question an experimental study was conducted to test the middle-range theory of the DNT Model. In this chapter, the investigation sample is described followed by the findings from the investigation.

Sample Characteristics

To ensure that students’ rights were protected, approval was secured from the Institutional Review Boards of the University and the study facility prior to implementation of the study. Using convenience sampling, volunteers for the study were sought from nursing students in the first semester of their senior year at one institution. Students were recruited from the Nursing Practice IV/Adult Health I course during the first weeks of the semester. Of the 46 students in the class, 44 consented to participate following a brief presentation on the study. Written consent and demographic data were obtained. All 44 participants completed both the pretest and posttest, a simulated clinical experience (SCE), as a part of their coursework. Each student’s performance was scored by faculty using the Lasater Clinical Judgment Rubric (LCJR). All participants completed the study. Students were randomly assigned to clinical groups, and the clinical groups were randomly chosen to be either in the control or intervention group. The intervention was based on clinical groups which varied from nine to ten students.
each. Two groups received the intervention \((n = 18)\) while three groups were used for control \((n = 26)\).

Descriptive statistics were used to describe the frequencies and percentages of demographic data for both the intervention and control groups. The intervention group was made up of three males and 15 females, while the control group had one male and 25 females. Students’ ages in the intervention group fell into the ranges of 21-24 (14) (78%), 25-34 (2) (11%), and 45-54 (2) (11%). Racial/ethnic make-up of the intervention group was one Hispanic (5%), 15 white (84%), one African-American (5%), and one Asian (5%). Two (11%) spoke English as a second language. Of the intervention group, five were married (28%), 13 were single (72%), 14 (78%) worked outside of the home, six (34%) had some experience working in health care, and two (11%) had completed either associate’s or bachelor’s degrees prior to starting nursing school.

Demographics for the control group \((n = 26)\) were as follows: their ages were 21-24 (20) (77%), 25-34 (2) (8%), 35-44 (3) (12%) and 45-54 (1) (3%). Racial/ethnic make-up of the control group was one Hispanic (4%), 23 white (89%), one African-American (4%), and one Asian (4%). One (3%) spoke English as a second language. Of the control group, seven (27%) were married and 19 (73%) were single, 17 (65%) worked outside of the home, eleven (42%) had some experience working in health care, and four (15%) had completed either associate’s or baccalaureate degrees prior to starting nursing school (see Figure 2).
Major Findings

The purpose of this study was to evaluate the effect of using the DNT Model as a teaching tool on the clinical judgment of senior baccalaureate nursing students in high fidelity human patient simulation (HFHPS) as measured by the Lasater Clinical Judgment Rubric (LCJR). The research question asked, how does the DNT Model affect nursing students’ clinical judgment in simulation? Pretests and posttests using the LCJR provided the data to address this question. An ordinal scale was applied to the LCJR rubric to facilitate analysis (Lasater, 2006). Answers at the Beginning level were scored 1 point, Developing: 2 points, Advanced: 3 points, and Exemplary: 4 points.

The mean clinical judgment score for the control group \((n = 26)\) pretest was 25.62 points \((SD = 3.72)\). The observed range on the pretest was 15 to 29 points, with a
maximum of 44 possible points. The mean score for control group’s posttest was 28.54 points ($SD = 2.39$), and the observed range was 24-33. The difference between pretest and posttest scores was 2.92 points ($SD = 3.83$). Results of the paired $t$-test demonstrated a significant difference in clinical judgment scores in the control group ($p = 0.000$).

For the intervention group ($n = 18$), the mean LCJR pretest score was 26.67 points ($SD = 2.28$). The observed range on the pretest was 42 to 31 points, with a maximum of 44 possible points. The mean score for the intervention group’s posttest was 28.0 points ($SD = 1.85$), and the observed range was 24-31. The difference between pretest and posttest scores was 1.33 points ($SD = 3.11$). Results of the paired $t$-test demonstrated a significant difference in clinical judgment scores in the intervention group ($p = 0.043$).

Both the intervention and control groups showed a significant increase in clinical judgment skills on the LCJR posttest, but the control group's increase ($p = 0.000$) was greater than the intervention group ($p = 0.043$). With a statistically non-significant Levene’s test assuring equality of variance ($F [26, 18] = 0.132, p = 0.717$) the independent samples $t$-test of equal variance was applied. The differences between the control and intervention groups’ pretest scores were not significant ($p = 0.069$).

Though the result was statistically non-significant, a statistical a priori analysis was performed using the G*Power 3.1.9 software (Faul, Erdfelder, Buchner, & Lang, 2009). Power analysis showed that a sample of 70 would be required for even a large effect size (0.5) with a power of 0.95 (significance set at 0.05). This confirms the conclusion indicated by the statistically non-significant result, that this sample was too small to achieve adequate statistical power (O’Keefe, 2007). Table 1
Table 1

Results of Paired t-tests

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>( N )</th>
<th>Pretest Score (SD)</th>
<th>Posttest Score (SD)</th>
<th>Difference (SD)</th>
<th>( P^* )</th>
<th>Independent t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>26</td>
<td>25.62 (3.72)</td>
<td>28.54 (2.39)</td>
<td>2.92 (3.83)</td>
<td>0.000</td>
<td>0.069</td>
</tr>
<tr>
<td>Intervention</td>
<td>18</td>
<td>26.67 (2.28)</td>
<td>28.00 (1.85)</td>
<td>1.33 (3.11)</td>
<td>0.043</td>
<td></td>
</tr>
</tbody>
</table>

*Results of paired t-tests

It must be noted that there were two outliers in the control group which affected the study results. These outliers were determined by examining values that were 1.5 times the Interquartile Range (IQR) above the third quartile (Q3) or below the first quartile (Q1). Q1=1 and Q3=4, making the IQR 3. The median difference between pre- and posttest scores for the control group was 3. Therefore, any pre-posttest difference of >8.5 or less than -3.5 can be considered an outlier. There were two values which fell into the >8.5 range: 11 and 15. Upon examination, these two students scored exceptionally low on their pretests: both scored 15. These scores were >1.5 IQR below the Q1, (Q1=25, Q3=28, IQR= 3). Statistically, these can be considered outliers. There were no outliers in the intervention group, either in pretest or difference between test scores.

Consideration was given to using an analysis of the data with the outliers removed. However, even with these changes, the overall analysis was unchanged: the results of the paired t-test demonstrated a significant difference in clinical judgment scores in the control group between the pre- and posttests (\( p = 0.000 \)). Also, the differences between the control and intervention groups’ pretest scores with outliers removed were not significant (\( p = 0.202 \)), compared to (\( p = 0.069 \)) with outliers included.
Summary

The purpose of this capstone project was to evaluate the effect of using the Developing Nurses’ Thinking (DNT) Model as a teaching tool on the clinical judgment of senior baccalaureate nursing students in high fidelity human patient simulation (HFHPS) as measured by the Lasater Clinical Judgment Rubric (LCJR). The research question asked, how does the DNT Model affect nursing students’ clinical judgment in simulation? Pretests and posttests using the LCJR provided the data to address this question.

The results of the data analysis indicated a significant increase on posttest clinical judgment scores for both the control group ($p = 0.000$) and intervention group ($p = 0.043$) there was no significant difference in posttest scores between the groups. In fact, the clinical judgment scores of the control group showed a more significant increase than the intervention group. Discussion of the results can be found in the following chapter.
CHAPTER V

Discussion

A discussion of the investigation of the Effect of the Developing Nurses’ Thinking (DNT) Model on Clinical Judgment in Nursing Students is presented in this chapter. The purpose of this capstone project was to examine the effect of the DNT Model on nursing students’ clinical judgment in simulated clinical experiences (SCE). To this end, an experimental study was conducted to test the middle-range theory of the DNT Model. Following a summary of the investigation, the study results are presented and implications discussed. The chapter concludes with a presentation of the limitations of the study and recommendations for further research.

Implications of Findings

The purpose of this investigation was to test the effect of the DNT Model as a teaching tool on the clinical judgment of senior baccalaureate nursing students. Tanner’s Clinical Judgment Model formed the conceptual framework for this study. An experimental, pretest/posttest, quantitative research design was used in this study. The experimental design is appropriate for this study which seeks to test the application of a predictive middle-range theory. The dependent variable in this study was clinical judgment scores in simulation as measured by the Lasater Clinical Judgment Rubric (LCJR). The independent variable is use of the DNT Model in clinical post-conferences.

The sample consisted of 44 senior baccalaureate nursing students at a southeastern university baccalaureate school of nursing. The pretest, which used the LCJR to measure clinical judgment skills of the participants in an SCE using high fidelity human patient simulation (HFHPS), was completed during the first weeks of the
semester. This was followed by two weeks of implementing the DNT Model in clinical post conferences for two clinical groups which made up the intervention group \((n = 18)\) while three clinical groups made up the control \((n = 26)\). Posttests were conducted when the intervention was completed.

Paired \(t\)-tests were used to assess the differences between participants’ scores on the LCJR at the beginning of the semester and after the intervention to assess growth of clinical judgment. The independent \(t\)-test was used to evaluate the difference between groups in the mean difference between pre- and post- LCJR scores. There were statistically significant increases in posttest scores for both the intervention and control groups, with a slightly larger increase in the control group. The difference between the improvements of the two groups was not statistically significant. The results of this study did not demonstrate that use of the DNT Model positively affected clinical judgment scores of nursing students in simulation.

This investigation was prompted by the original study by Tesoro (2012), which tested the impact of her DNT Model on the clinical reasoning of nursing students. Her study demonstrated a positive relationship between the DNT Model and clinical reasoning as measured by nursing diagnostic accuracy in case studies. Based on the relationship between critical thinking, clinical reasoning, and clinical judgment, it was reasonable to posit that use of the DNT Model would also impact clinical judgment as measured in a simulated clinical experience (SCE). The Lasater Clinical Judgment Rubric (LCJR) was the instrument chosen to evaluate the effect of the DNT Model because it has been shown to be a valid and reliable tool for measuring clinical judgment in the simulation environment.
The intervention in the present investigation was similar to that used in Tesoro’s study. Both studies utilized the DNT Model in two consecutive clinical post conferences to guide students through its application to case studies and in the choice of appropriate nursing diagnoses. However, instead of using nursing diagnostic accuracy in case studies as the outcome, the present study used clinical judgment scores in an SCE. Exactly why the outcomes of these studies were different is not clear, but there are a number of factors that may have contributed to these differences.

First, there is a great difference between learning to accurately apply nursing diagnoses to a case study and the ability to demonstrate the use of clinical judgment in an SCE. The SCE makes greater demands on the student. Whereas a case study provides the assessment data and only requires the student to identify an accurate nursing diagnosis, the SCE requires the student to complete the entire nursing process within a specified time frame. The student must obtain the assessment data, formulate diagnoses, plan, intervene, and evaluate. This process must take place within a specific time frame, which may be pre-determined by the scenario or regulated by the simulation facilitator.

Considering the differences between these two methods of measuring outcomes, a longer exposure or more intensive use of the DNT Model might have resulted in a greater effect on clinical judgment. While the intervention was appropriate in Tesoro’s study to affect an outcome in clinical reasoning and nursing diagnosis accuracy, maintaining the same level of intervention was not sufficient to affect improvement in clinical judgment in simulation. It is possible that either the timeframe of the intervention was too short, the frequency was too low, or both, to produce statistically significant results.
The timing of the intervention may have also played a role in the outcome of this study. The DNT Model was presented and put into practice during two consecutive clinical post conferences. These post conferences took place at the end of a 12-hour clinical day, during the last two hours, after the students had spent 10 hours on the nursing units. It is likely that when this teaching was done the students were significantly fatigued. Evidence has shown that fatigue decreases attentiveness and cognitive processing, as well having negative effects on memory and recall (Palmer, 2013). Further investigation of the DNT Model may demonstrate greater effectiveness if the teaching is done at a time when students are more able to pay attention, think critically, and recall information. The timing of the intervention was selected out of convenience; it was the only time that both the instructor and students could easily come together, without requiring the participants to attend additional classes. This was done to allow the maximum number of students to participate in the study. In the future it would be beneficial to look at alternative times for the intervention.

Another factor which may contribute to the outcomes may be the scenarios that were selected for the pre- and posttest. Both SCEs were produced by CAE Healthcare for use with METIman. This medical simulation company produces simulators as well as clinical scenarios developed by experts for use in HFHPS (CAE Healthcare, 2013). These scenarios were specifically selected to align with the course content from the Adult Health Course. The scenarios seemed to have comparable levels of difficulty, but there is no objective rating of complexity available. The pretest SCE depicted a patient admitted to the ER with COPD exacerbation, while the posttest depicted a patient status post colon resection. Both SCEs progress through various phases with changes in patient condition.
dependent on student action or inaction. It is possible that the pre- and posttest scores may reflect a difference in the students’ understanding of either respiratory or gastrointestinal content, their previous clinical experiences with similar conditions, or comfort level with differing skills, such as nasogastric tube insertion or collaborating with healthcare team members. These confounding variables might be mitigated in future studies by using simulations based on the same conceptual content instead of introducing new ones, or obtaining scenarios which are rated according to level of difficulty.

Another simulation-related factor that may have affected the outcome is that the students had limited exposure to SCEs prior to this study. The two outliers (extremely low pretest scores) in the control group may indicate the level of discomfort students had with performance in simulations in general. Also, the original plan for this study was to have students go through the SCE in groups of two, but due to scheduling difficulties, they were in groups of three to four. The size of the groups may have prevented some of the participants from taking more active roles in the SCE, which may have affected their scores. A similar study, which examined the effect of concept-based learning activities on clinical judgment in simulation, used groups of two to three, but only rated the student in the role of the primary nurse. Although this procedure may allow for closer examination of one student’s performance, it also limited the sample size because it is time-consuming and labor-intensive (Lasater & Nielsen, 2009). However, this procedure could be considered in future studies.

Another factor that contributed to the non-statistically significant results was the size of the sample. Sample size was determined by a statistical priori analysis using the
G*Power 3.1.9 software (Faul et al., 2009). Power analysis showed that a sample of 70 would be required for even a large effect size (0.5), indicating that this sample was too small to achieve adequate statistical power. Because this was a convenience sample from only one school of nursing, the study was limited by class size. Collaboration with other schools of nursing could be a feasible option to increase sample size and statistical power. It would also bring more demographic diversity to the sample, which could increase the generalizability of the results.

The findings of this study are important because they further the evidence base about critical thinking in nursing education. The results of this study demonstrated the complexity of teaching and evaluating clinical judgment. Improving this ability in nursing students requires an intensity and/or frequency beyond what is needed to simply teach critical thinking. Even though it is an essential component of clinical judgment, the ability to think critically alone is insufficient. Even when combined with nursing knowledge and an understanding of the context of patient safety, as the DNT Model describes, the element of continued experiential learning is vital.

This finding fits with the recommendation of Benner et al. (2010) in their book on transforming nursing education. In order to radically transform nursing education, they admonish educators to change the way they foster learning in nursing students. One of the four essential shifts they recommend is the “shift from an emphasis on critical thinking to an emphasis on clinical reasoning and multiple ways of thinking that include critical thinking” (p. 84). The authors propose that critical thinking is just one type of reasoning used in professional practice, and that educators need to include multiple ways of thinking in their curriculum, instead of focusing on critical thinking alone.
Critical thinking is an essential skill for nurses, necessary for safe, competent practice. However, educators must change their ways of teaching to allow students to learn how to reason through experience. They must learn through practicing critical thinking, and other ways of thinking, in the context of nursing practice. Only as thinking skills are applied to particular patient situations are learners able to grasp the big picture. This includes knowledge of the patient, their responses, trends, and reflecting on their nursing care. The clinical experience is the ideal setting for educators to be able to coach students through the thought processes involved in caring for patients in real time, but the experience can also be brought to the classroom through evolving case studies. Both opportunities offer a chance for educators to guide the learner in using a wide array of thinking skills in order to encourage the development of strong clinical reasoning and judgments.

**Application to Theoretical/Conceptual Framework**

The theoretical framework for this study was Tanner’s Clinical Judgment Model. Her model of “thinking like a nurse” (p. 204) was drawn from a systematic review of the literature and reflects the complexity of clinical judgment in practice (Tanner, 2006). Tanner defined clinical judgment as, “an interpretation or conclusion about a patient’s needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p. 204). Tanner’s Clinical Judgment Model is an iterative process that has four main aspects: Noticing, Interpreting, Responding, and Reflecting.

Tanner’s first conclusion based on her review of the literature is that clinical judgment is more influenced by the nurse than by the actual patient situation. Tanner
explains that various types of knowledge are required for clinical judgment. Some of these types of knowledge are learned through science and theory, and some are learned through experience. The student nurse and new graduate do not have the advantage of experience, and therefore must rely on previously acquired knowledge and analysis of the situation, often learning as they go. The nurse’s moral values and perspectives also affect the judgments they make.

Tanner’s (2006) second conclusion is that the nurse’s knowledge of and relationship with the patient affects clinical judgment. This raises the question of how much patient engagement is possible with a mannequin. Tanner describes clinical judgment as, “engaged moral reasoning” (2006, p. 209). The virtual patients used in HFHPS are made to be as lifelike as possible, but the student’s ability to know the patient, to form a relationship, to empathize with them, and to provide care based on ethical and moral values is questionable. Some students may find it easier to respond to a virtual patient realistically, but some struggle with these challenges. This is another factor which must be taken into account when evaluating a student’s performance in simulation, and an area that needs further study. Other factors that affect clinical judgment are the context and culture in which the care takes place.

Tanner also concluded that nurses use many different ways of thinking and reasoning in practice. These depended on the patient situation, the nurse’s understanding of the situation, and the nurse’s background, and the nurse’s goals. No one way of thinking or reasoning will work in every situation for everyone. Based on Tanner’s model, the challenge for nurse educators is not only to teach the knowledge and critical thinking skills needed for practice, but to also help students engage with their patients
and to act according to professional, moral, and ethical standards. As educators help their students achieve these goals they are preparing them to use sound clinical judgment in professional practice.

Tanner’s Clinical Judgment Model provided an appropriate framework for this study. The findings of this study were congruent with this model. The findings correspond with Tanner’s findings that clinical judgment is a complex concept that is dependent not only on the patient and their situation, but on the characteristics, values, and engagement of the nurse. Although critical thinking is essential to clinical judgment, there are many more aspects that play a part. The educator must help students to develop their critical thinking abilities, but to focus on only thought processes will not fully prepare students to think like nurses in professional practice.

The LCJR was used to measure outcomes for this study. Based on Tanner’s Clinical Judgment Model, it delineates four varying levels of achievement; Beginning, Developing, Advancing, and Exemplary, in each of Tanner’s four aspects of clinical judgment: Noticing, Interpreting, Responding, and Reflecting. The rubric provides descriptions of behaviors that indicate understanding and utilization of these four aspects. This allows standardized evaluation of the abstract concepts that make up clinical judgment. The LCJR facilitates measurement of clinical judgment outcomes in the simulated healthcare setting and gives insight into students’ stage of clinical judgment and evaluation of progress in clinical judgment over time. This instrument has been shown to be reliable and valid in multiple studies (Lasater, 2006; Adamson et al., 2012).

Lasater (2011) notes that one limitation of the LCJR is that it only measures the four aspects of clinical judgment and cannot account for the many complex factors that
Tanner describes as contributing to clinical judgment. These include student’s knowledge and experiences, cultural influence, learning styles, expectations, and values, as well as the context and culture of the clinical situation. Because of these limitations, the evaluation of clinical judgment cannot be entirely objective.

Another limitation related to the LCJR is faculty experience with its use. The rubric is complex, requiring the observance of eleven different behaviors that represent the aspects of clinical judgment. Each of these is scored according to level of achievement, which are described in the rubric. The LCJR was introduced specifically for this study, and although faculty was trained in its use, there was limited time for practice prior to its implementation. This may have affected the results.

The DNT Model can positively affect clinical judgment as seen in Tesoro’s study, which demonstrated an improvement in the accuracy of nursing diagnosis among senior nursing students. This present study sought to provide further testing of this model using a more in-depth indicator of desired outcomes: clinical judgment scores in high fidelity human patient simulation (HFHPS). Tesoro’s DNT Model was influenced by Tanner’s work on clinical judgment, and is based on the theory of Human Intelligence by Sternberg. This theory differentiates between three different spheres of learning: internal environment, external environment, and experience. Tesoro applies these three spheres to the DNT Model. The first sphere, internal environment, includes the concepts of nursing domain knowledge, which includes the nursing process, and critical thinking skills. The external environment is the second sphere of learning. For the DNT Model, this is the context of patient safety. The third sphere, experience, is gained through the repeated application of the DNT Model in nursing practice. Considering these spheres of
learning from the perspective of this study’s results may give insight into why the findings did not demonstrate any effect on clinical judgment scores of nursing students in simulation.

First, the internal environment: nursing knowledge should be continually expanding throughout the semester, through course didactic and clinical experiences. This is supported by the study results: both the intervention and control groups showed a significant increase in their clinical judgment scores over the semester. In the control group, the mean difference between pretest and posttest scores was 2.92 points ($SD = 3.83$). Results of the paired $t$-test demonstrated a significant difference in clinical judgment scores ($p = 0.000$). In the intervention group, the difference between pretest and posttest scores was 1.33 points ($SD = 3.11$). Results of the paired $t$-test demonstrated that the intervention made a significant difference in clinical judgment scores ($p = 0.043$).

The second aspect of the internal environment has been less well presented in the literature. Studies have shown that critical thinking skills may or may not improve throughout nursing school. A recent study by Hunter et al. (2013) measured critical thinking in nursing students using the Health Science Reasoning Test. This validated test was designed to assess the critical thinking skills of interprofessional healthcare students (Cox, Persky, & Blalock, 2013). Their study found that overall critical thinking scores were positively correlated with years of study, demonstrating that these skills did improve through the educational process. Another study by Mann (2010) examined critical thinking development in nursing students over a semester using the Assessment Technologies Institute’s (ATI) Critical Thinking Assessment as both pre- and posttest. Neither intervention nor control group showed a significant increase in scores at the end
of the intervention, but this study was limited by the time involved. The span of one semester may be too short a period of time to see significant increases in critical thinking.

One recent systematic review examined the acquisition of critical thinking skills in healthcare professional education. They examined the literature of five different healthcare professions, and their findings were mixed. Although most of the studies showed improvement, the small study sizes and lack of statistical power limit their generalizability. The authors recommend continued research into the subject, but with more rigorous design and larger sample sizes (Brudvig, Dirkes, Dutta, & Rane, 2013). In summary, the internal environment consists of nursing domain knowledge, which has been consistently shown to improve with education, and critical thinking skills, which the literature is lacking strong research.

Next, the external environment of patient safety is foundational to the nursing school experience. Patient safety is one of the Quality and Safety Education for Nurses (QSEN) competencies, which are regarded as critical to educating nurses that can navigate and improve today’s complex healthcare environment. QSEN competencies are fundamental to the organizing curricular framework of the study facility and are an integral part of every course. Therefore, it is believed that the sphere of external environment did not significantly contribute to the lack of improvement in clinical judgment in this study.

The third sphere, experience, may have been the greatest contributor to the lack of improvement in clinical judgment scores. Meeting with the intervention groups two times over the semester, for one hour at a time to teach and allow them to work through the DNT Model, probably does not meet the criteria of repeated experience that is
essential to the model. Especially after examining the difference in demands between a written case study and an SCE, it is apparent that due to the greater student demands in the SCE more experience with this model may contribute to significant results.

**Limitations**

The findings of this study should be interpreted in light of several limitations. Since only one school of nursing was used in this study, the results may not be generalizable to nursing students in other programs. Analysis of the demographics for this sample shows a relatively homogeneous group of traditional students. This sample may vary significantly from other programs. Since only baccalaureate nursing students were included in this sample, the results cannot be generalized to diploma or associate degree nursing students. The final limitation related to the sample is the sample size. This study was underpowered to detect possible effects of the DNT Model on the clinical judgment of nursing students in simulation. Collaborating with other schools of nursing would allow for an adequate sample size upon which to base inferences about practice.

Other limitations were related to the use of HFHPS. The students’ limited exposure to SCEs prior to this study was likely reflected in their clinical judgment scores. This could be mitigated by ensuring the students have exposure to SCEs prior to the pretest, or by presenting the pretest later in the semester. Also, the complexity and difference in content in the two SCE scenarios may have affected outcomes. Consideration should be given to the difficulty of the scenarios and the nursing concepts that are involved.

An additional limitation was related to time constraints. First, there were constraints on the time of both the investigator and the students. It was a challenge to
schedule the pretest, posttest, and intervention with multiple groups, and to coordinate time in the clinical setting and in the simulation lab. It is likely that the time and frequency of the intervention affected the results of this study. Future studies could integrate the content and testing into the curriculum to allow for more intensity of the intervention.

Finally, limitations of this study include deviations from the original plan which were related to unforeseen circumstances. The first deviation was regarding the intervention and control groups. It was anticipated that the two groups would be approximately equally sized, but because of the configuration of clinical groups and scheduling, the control group \((n = 26)\) was larger than the intervention group \((n = 18)\). Instead of the posttest being conducted on the second of two regularly scheduled SCEs, another SCE was added, making the posttest the third of the semester and possibly affecting results. Also, instead of having multiple faculty trained to use the LCJR to evaluate student performance, one was selected to simplify scheduling and reduce the risk of poor interrater reliability.

**Implications for Nursing**

New graduate nurses face many challenges as they begin work as professional nurses. The education/practice gap is evident in the study by Berkow et al. (2011), which found that that only 10% of frontline nurse leaders believe that new graduate nurses are competent to provide safe, effective nursing care, while almost 90% of academic nursing leaders hold this belief. Only 25% of these nurse leaders who were satisfied with new graduates’ critical thinking proficiency, even among those working with primarily BSN graduates.
Although the ability to think critically is an important aspect of clinical reasoning and judgment, it is only one aspect (Fero et al., 2010). This study demonstrates the importance of educational strategies to improve critical thinking, but it also shows the need to teach our students to use other forms of thinking and reasoning so that they can use sound clinical judgment. Clinical judgment is a complex concept, which develops fully with years of experience. Yet educators can give their students a strong foundation of clinical judgment, an essential component of safe professional nursing practice, which leads to positive patient outcomes (Lasater, 2011).

**Recommendations**

Recommendations for the nursing profession are presented in this section. Although this project focused on education, there are also ramifications for practice. Finally, in light of the findings of this study, recommendations are made about future research.

**Nursing practice**

Clinical judgment is essential for safe nursing practice. It is a crucial competency for making sound patient care decisions and for positive patient outcomes (Lasater, 2011). Nurses use clinical judgment in all aspects of patient care. They must be able to continually identify changes in patient condition, interpret and intervene appropriately, evaluate interventions, reflect on their practice, and prioritize care. The primary goal of nursing education is to prepare students for professional nursing practice. This includes the core concepts of critical thinking and clinical judgment, which the American Association of Colleges of Nursing (AACN)(2008) describes as core competencies for
the nursing process and management of the care of both individual patients and populations.

However, the challenges associated with teaching and evaluating these abilities are many, and results of studies are inconsistent. Therefore, it is recommended that evaluation of nurses’ critical thinking and clinical judgment be a part of the orientation process and that these abilities are evaluated regularly throughout their practice. New graduate nurse residency programs (or similar initiatives) could be a key to ensuring that new nurses have the critical thinking and clinical judgment skills needed for successful practice. Unit educators and/or nurse managers should also be involved in evaluating these abilities as a part of the employee evaluation process. The use of simulation or other active learning strategies can be utilized in the hospital setting to enhance the clinical judgment skills of practicing nurses.

Nursing education

A major role of nurse educators is to facilitate learning and evaluation of critical thinking and clinical judgment competencies which students need for entry into professional nursing practice. Educators must align their practice with the evidence. Recent research describes the impact of various learning activities and approaches which have been shown to positively affect both critical thinking and clinical judgment. These educational strategies are learner-centered, involve active student engagement, and are based on experiential learning theories of Dewey (1997) and Kolb and Kolb (2005). Experiential learning states that learning only comes through individual experience. It is recommended that educators teach these concepts in a way which actively engages learners, constructing learning opportunities that reinforce content and which allow
students to put their learning into practice. It is also recommended that educators use valid, reliable tools for evaluating critical thinking and clinical judgment. Even though this is a relatively new area of research, some evidence-based tools are available for use. The Lasater Clinical Judgment Rubric is one such a tool which can be used in the simulated or actual clinical environment.

The Tanner Clinical Judgment Model provides a useful framework for teaching and evaluating clinical judgment, defines the process of thinking like a nurse, and provides a common language to use in teaching and evaluating clinical judgment, both for nursing students and for nurses in practice. It is recommended that educators teach students to use this framework to guide their decision-making in the clinical setting. It is also recommended to use this model as a tool to guide reflection, both during debriefing following simulation, or upon actual clinical experiences.

**Future research**

Nursing research informs nursing theory, which in turn guides practice, which provides a testing ground and can form the basis for theory. Nurse educators must continue to develop an evidence base for educational strategies that promote critical thinking and clinical judgment, so that nursing students can be adequately prepared to meet the demands of professional nursing practice. Even though this study did not demonstrate that the DNT Model affected clinical judgment scores in simulation, it still holds potential as a tool that can be used to guide students in critically thinking through the nursing process. Based on the results of this study, recommendations for future research are:
1. Utilize standardized definitions of terminology in future research. It is essential for nursing research, education, and practice that these concepts are clearly defined and are used consistently.

2. Study the effect of the DNT Model on clinical judgment in simulation, but with increased frequency or time of exposure to the intervention. This model has been shown to impact clinical reasoning, but more study is needed to determine best practice regarding clinical judgment.

3. Replicate this investigation, with the recommended changes, at other baccalaureate nursing programs with a larger sample size or collaborate with other schools of nursing. A larger, more diverse sample would increase generalizability.

4. Explore the concepts of the nurse-patient relationship, ethical obligations, and moral values in the setting of simulation. Because of the importance of these concepts in clinical judgment, it is essential to understand the effect of simulation on them. This is an apparent gap in the literature.

5. Replicate other studies on learning strategies that have shown positive impact on clinical judgment, but with a larger sample and using a more rigorous research design. Many of the existing studies either have small samples or a less robust methodology. This would add to the body of evidence to support nursing education and practice.

6. Examine factors which influence the development of critical thinking abilities in nursing students. A recent systematic review of critical thinking in nursing education revealed the need for further research into these factors, including those
related to students, faculty, system, and environment, all of which are crucial to the facilitation of learning critical thinking skills, and therefore, clinical judgment (Chan, 2013).

**Conclusion**

This capstone project examined the effect of the DNT Model on the clinical judgment of senior baccalaureate nursing students. The dependent variable in this study was the clinical judgment score, measured through use of the LCJR in SCEs. Both the intervention and control groups showed statistically significant improvements in clinical judgment scores from the pretest to the posttest. There was no statistically significant difference between the two groups. However, the sample size was too small to achieve adequate statistical power, which limits the conclusions that can be drawn from this investigation.

The development of clinical judgment is essential for safe, competent nursing practice in today’s complex healthcare environment. Nurse educators press toward the goal of facilitating this core competency in nursing students. Further investigation of educational strategies to accomplish this goal must remain a priority in nursing education. Development of the evidence base for teaching critical thinking and clinical judgment must continue, as educational strategies and models are developed and tested in practice. This capstone project studying the effects of the DNT model on the clinical judgment of senior nursing students has contributed to the nursing profession by testing the effect of this middle-range theory in nursing education. The growing body of knowledge on the development of clinical judgment will better equip educators to prepare baccalaureate nursing students for safe, competent professional practice.
References


model to enhance nursing students’ ability to identify and manage clinically ‘at risk’ patients. Nurse Education Today 30, 515–520.


Tesoro, M. (2012). Effects of using the developing nurses’ thinking model on nursing students’ diagnostic accuracy. *Journal of Nursing Education. 51*(8), 436-443.


Appendix A

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March 10, 2014

Kris Douglas, DNP, RN-BC
Assistant Professor
Shorter University School of Nursing
1720 Wayside Road
Kingston, GA 30145

Reference #: J17396037
Material Requested: Figure
Usage Requested: Reprinted in print and electronic versions of DNP capture project entitled "The Effect of the Developing Named Thinking Model on Clinical Judgment in Nursing Students."
Citation: Tanzer, C.A. (2006). Thinking like a nurse: A research-based model of clinical judgment in nursing. Journal of Nursing Education, 45(6), 204-211.

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Appendix B
Tesoro’s Developing Nurses’ Thinking (DNT) Model (Used by permission)
<table>
<thead>
<tr>
<th>Critical Thinking Skills</th>
<th>Patient’s presentation and assessment findings</th>
<th>Habits of the Mind</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analyzing</strong></td>
<td></td>
<td>Confidence</td>
</tr>
<tr>
<td>• Break up the clinical situation into parts (cues) to determine meaning (i.e., normal vs. abnormal). Identify cues.</td>
<td>, Are you confident in your reasoning abilities?</td>
<td></td>
</tr>
<tr>
<td>• Cluster cues to determine meaning.</td>
<td></td>
<td>Contextual perspective</td>
</tr>
<tr>
<td>• Generate hypotheses.</td>
<td></td>
<td>Have you considered the entire context of this problem? Age, co-morbidities, medication, etc.</td>
</tr>
<tr>
<td><strong>Applying standards</strong></td>
<td></td>
<td>Creativity</td>
</tr>
<tr>
<td>• Use research based standards/rules to rule in or rule out hypothesis.</td>
<td></td>
<td>Were you creative when you generated or restructured ideas? Did you think of alternatives?</td>
</tr>
<tr>
<td>• NDX defining characteristics, related factors and risk states, patho</td>
<td></td>
<td>Flexibility</td>
</tr>
<tr>
<td>• Making a judgment as to “fit”</td>
<td></td>
<td>Did you consider multiple possibilities? Did you get stuck on one train of thought?</td>
</tr>
<tr>
<td><strong>Discriminating</strong></td>
<td></td>
<td>Inquisitiveness</td>
</tr>
<tr>
<td>• Look for differences and similarities.</td>
<td></td>
<td>Were you eager to correctly interpret the situation/problem and did you use observation and thoughtful questioning to explore possibilities?</td>
</tr>
<tr>
<td>• Does this help confirm or disconfirm hypothesis.</td>
<td></td>
<td>Intellectual Integrity</td>
</tr>
<tr>
<td><strong>Information seeking</strong></td>
<td></td>
<td>• Did you use research-based process and research-based criteria to interpret the situation/problem?</td>
</tr>
<tr>
<td>• Do you need more information to solve this problem?</td>
<td></td>
<td>• Guessing without a basis for deriving meaning does not count</td>
</tr>
<tr>
<td>• Consider gathering data from patient/SO, lab data, further physical assessment, standards of care, etc.</td>
<td></td>
<td>Intuition pattern recognition</td>
</tr>
<tr>
<td><strong>Logical reasoning</strong></td>
<td></td>
<td>Did you recognize anything that seemed familiar from past experiences?</td>
</tr>
<tr>
<td>• Draw conclusions.</td>
<td></td>
<td>Open-mindedness</td>
</tr>
<tr>
<td>• If this then probably that.</td>
<td></td>
<td>Were you open to other possible interpretations of the situation/data?</td>
</tr>
<tr>
<td>• Confirm or disconfirm DX</td>
<td></td>
<td>Perseverance</td>
</tr>
<tr>
<td><strong>Predicting</strong></td>
<td></td>
<td>Were you determined to accurately interpret the situation/problem?</td>
</tr>
<tr>
<td>• Predict potential patient problems and envision a plan &amp; desired outcomes.</td>
<td></td>
<td>Reflection</td>
</tr>
<tr>
<td>• How will this problem affect patient safety? If I do this then…</td>
<td></td>
<td>Did you constantly reflect on your thinking, assumptions, and decisions to assure accurate interpretation of data?</td>
</tr>
</tbody>
</table>

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*Teore 9/2012*
### Problem Sheet: these can be NANDA (decreased cardiac output), possible medical problem (infection, MI), or description of the problem (change in mental status)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Confirming Characteristics</th>
<th>Disconfirming</th>
<th>Patient Safety</th>
<th>Expected Outcomes</th>
<th>Interventions/ Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>1.</td>
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<tr>
<td>2.</td>
<td></td>
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</tr>
</tbody>
</table>
### LASATER CLINICAL JUDGMENT RUBRIC

#### Noticing and Interpreting

<table>
<thead>
<tr>
<th>Effective NOTICING involves:</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused Observation</td>
<td>Focusses observation appropriately, regularly observes and monitors a wide variety of objective and subjective data to uncover any useful information</td>
<td>Regularly observes/monitors a variety of data, including both subjective and objective; most useful information is noticed, may miss the most subtle signs</td>
<td>Attempts to monitor a variety of subjective and objective data, but is overwhelmed by the array of data; focuses on the most obvious data, missing some important information</td>
<td>Confused by the clinical situation and the amount/type of data; observation is not organized and important data is missed, and/or assessment errors are made</td>
</tr>
<tr>
<td>Recognizing Deviations from Expected Patterns</td>
<td>Recognizes subtle patterns and deviations from expected patterns in data and uses these to guide the assessment</td>
<td>Recognizes most obvious patterns and deviations in data and uses these to continually assess</td>
<td>Identifies obvious patterns and deviations, missing some important information; unsure how to continue the assessment</td>
<td>Focuses on one thing at a time and misses most patterns/deviations from expectations; misses opportunities to refine the assessment</td>
</tr>
<tr>
<td>Information Seeking</td>
<td>Assertively seeks information to plan intervention: carefully collects useful subjective data from observing the client and from interacting with the client and family</td>
<td>Actively seeks subjective information about the client’s situation from the client and family to support planning interventions; occasionally does not pursue important leads</td>
<td>Makes limited efforts to seek additional information from the client/family, often seems not to know what information to seek and/or pursues unrelated information</td>
<td>Is ineffective in seeking information; relies mostly on objective data, has difficulty interacting with the client and family and fails to collect important subjective data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective INTERPRETING involves:</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prioritizing Data</td>
<td>Focusses on the most relevant and important data useful for explaining the client’s condition</td>
<td>Generally focuses on the most important data and seeks further relevant information, but also may try to attend to less pertinent data</td>
<td>Makes an effort to prioritize data and focus on the most important, but also attends to less relevant/useful data</td>
<td>Has difficulty focusing and appears not to know which data are most important to the diagnosis; attempts to attend to all available data</td>
</tr>
<tr>
<td>Making Sense of Data</td>
<td>Even when facing complex, conflicting or confusing data, is able to (1) note and make sense of patterns in the client’s data, (2) compare these with known patterns (from the nursing knowledge base, research, personal experience, and intuition), and (3) develop plans for interventions that can be justified in terms of their likelihood of success</td>
<td>In most situations, interprets the client’s data patterns and compares with known patterns to develop an intervention plan and accompanying rationale; the exceptions are rare or complicated cases where it is appropriate to seek the guidance of a specialist or more experienced nurse</td>
<td>In simple or common/familiar situations, is able to compare the client’s data patterns with those known and to develop/explain intervention plans; has difficulty, however, with even moderately difficult data/situations that are within the expectations for students, inappropriately requires advice or assistance</td>
<td>Even in simple of familiar/common situations has difficulty interpreting or making sense of data; has trouble distinguishing among competing explanations and appropriate interventions, requiring assistance both in diagnosing the problem and in developing an intervention</td>
</tr>
</tbody>
</table>

### LASATER CLINICAL JUDGMENT RUBRIC

**Responding and Reflecting**

<table>
<thead>
<tr>
<th>Effective RESPONDING involves:</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Calm, Confident Manner</strong></td>
<td>Assumes responsibility; delegates team assignments, assess the client and reassures them and their families</td>
<td>Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations</td>
<td>Is tentative in the leader’s role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily</td>
<td>Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate</td>
</tr>
<tr>
<td><strong>Clear Communication</strong></td>
<td>Communicates effectively; explains interventions; calms/assures clients and families; directs and involves team members, explaining and giving directions; checks for understanding</td>
<td>Generally communicates well; explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport</td>
<td>Shows some communication ability (e.g., giving directions); communication with clients/families/team members is only partly successful; displays caring but not competence</td>
<td>Has difficulty communicating. Explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured</td>
</tr>
<tr>
<td><strong>Well-Planned Intervention/Flexibility</strong></td>
<td>Interventions are tailored for the individual client; monitors client progress closely and is able to adjust treatment as indicated by the client response</td>
<td>Develops interventions based on relevant patient data; monitors progress regularly but does not expect to have to change treatments</td>
<td>Develops interventions based on the most obvious data; monitors progress, but is unable to make adjustments based on the patient response</td>
<td>Focuses on developing a single intervention addressing a likely solution, but it may be vague, confusing, and/or incomplete; some monitoring may occur</td>
</tr>
<tr>
<td><strong>Being Skillful</strong></td>
<td>Shows mastery of necessary nursing skills</td>
<td>Displays proficiency in the use of most nursing skills; could improve speed or accuracy</td>
<td>Is hesitant or ineffective in utilizing nursing skills</td>
<td>Is unable to select and/or perform the nursing skills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effective REFLECTING involves:</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluation/Self-Analysis</strong></td>
<td>Independently evaluates/analyzes personal clinical performance, noting decision points, elaborating alternatives and accurately evaluating choices against alternatives</td>
<td>Evaluates/analyzes personal clinical performance with minimal prompting, primarily major events/decisions; key decision points are identified and alternatives are considered</td>
<td>Even when prompted, briefly verbalizes the most obvious evaluations; has difficulty imagining alternative choices; is self-protective in evaluating personal choices</td>
<td>Even prompted evaluations are brief, cursory, and not used to improve performance, justifies personal decisions/choices without evaluating them</td>
</tr>
<tr>
<td><strong>Commitment to Improvement</strong></td>
<td>Demonstrates commitment to ongoing improvement: reflects on and critically evaluates nursing experiences; accurately identifies strengths/weaknesses and develops specific plans to eliminate weaknesses</td>
<td>Demonstrates a desire to improve nursing performance: reflects on and evaluates experiences; identifies strengths/weaknesses; could be more systematic in evaluating weaknesses</td>
<td>Demonstrates awareness of the need for ongoing improvement and makes some effort to learn from experience and improve performance but tends to state the obvious, and needs external evaluation</td>
<td>Appears uninterested in improving performance or unable to do so; rarely reflects; is uncritical of him/herself, or overly critical (given level of development); is unable to see flaws or need for improvement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical Judgment Components</th>
<th>Observation Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Noticing:</strong></td>
<td></td>
</tr>
<tr>
<td>• Focused Observation:</td>
<td>E A D B</td>
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<tr>
<td>• Recognizing Deviations from Expected Patterns:</td>
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<tr>
<td>• Information Seeking:</td>
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<tr>
<td><strong>Interpreting:</strong></td>
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<tr>
<td>• Prioritizing Data:</td>
<td>E A D B</td>
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<tr>
<td>• Making Sense of Data:</td>
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<tr>
<td><strong>Responding:</strong></td>
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<tr>
<td>• Calm, Confident Manner:</td>
<td>E A D B</td>
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<tr>
<td>• Clear Communication:</td>
<td>E A D B</td>
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<tr>
<td>• Well-Planned Intervention/Flexibility:</td>
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<tr>
<td>• Being Skillful:</td>
<td>E A D B</td>
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<tr>
<td><strong>Reflecting:</strong></td>
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<tr>
<td>• Evaluation/Self-Analysis:</td>
<td>E A D B</td>
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<tr>
<td>• Commitment to Improvement:</td>
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<tr>
<td><strong>Summary Comments:</strong></td>
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