

Fostering Critical Thinking in Undergraduate

Nursing Students

by

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## ABSTRACT

Results from previous studies indicated nursing students needed to further develop critical thinking (CT) especially with respect to employing it in their clinical reasoning. Thus, the study was conducted to support development of students' CT in the areas of inference subskills that could be applied as they engaged in clinical reasoning during course simulations. Relevant studies from areas such as CT, clinical reasoning, nursing process, and inference subskills informed the study. Additionally, the power of simulation as an instructional technique along with reflection on those simulations contributed to the formulation of the study. Participants included junior nursing students in their second semester of nursing school. They completed a pre- and post-intervention Critical Thinking Survey, reflective journals during the course of the intervention, and interviews as the conclusion of the study. The intervention provided students with instruction on the use of three inference subskills (Facione, 2015). Moreover, they wrote reflective journal entries about their use of these skills. Quantitative results indicated no changes in various CT measures. By comparison, qualitative data analysis of individual interviews and reflective journals showed students: applied inference subskills in a limited way; demonstrated restricted clinical reasoning; displayed emerging reflection skills; and established a foundation on which to build additional CT in their professional roles. Limitations of the study included time—length of the intervention and limited power of the instruction—depth of the instruction with respect to teaching the inference subskills. Discussion focused on explaining the results. Implications for teaching included revision of the instruction in inference subskills to be more robust by extending it over time, perhaps across courses. Additionally, use of a 'flipped' instructional process

was discussed in which students would learn the subskills by viewing video modules prior to class and then are 'guided' to apply their learning in classroom health care simulations. Implications for research included closer examination of the development of CT in clinical reasoning to devise a developmental trajectory that might be useful to understand this phenomenon and to develop teaching strategies to assist students in learning to use these skills as part of the clinical reasoning process.

This dissertation is whole-heartedly dedicated to my husband and family.

To my dedicated husband, and partner, Allan,  
I most lovingly appreciate all the hard work  
you have done over the years to support me  
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## CHAPTER 1

### INTRODUCTION AND PURPOSE OF THE PROJECT

*The students along with their instructor file into the debriefing room in the simulation (SIM) lab. They are given a report on their patient who is a post-surgical patient having had a below the knee amputation. The patient has a long history of diabetes and lower extremity wounds that will not heal. After a detailed patient report from the simulation nurse, they are given a brief orientation to their “unit” and location of all equipment to be used in the scenario. Then they all go back into the debriefing room with their instructor. They discuss any gaps they may have in their writing from the nursing report received. Groups of two to three students are then assigned to each scenario to be utilized for their learning. One brief scenario involved the patient having an elevated blood glucose level. She presented them with symptoms of hyperglycemia such as confusion, hunger, and thirst and asked them questions about what was happening to her since she felt very strange. Students were unaware of the change (med error) that had occurred between scenarios as the SIM nurse had set up the present scenario. She had hung the intravenous solution containing 10% dextrose in place of the 0.9% saline solution that was ordered. The students needed to collaborate and reassess the situation including the patient environment, which would have given them their answer to the scenario to simply change out the intravenous solution. This required the students to use CT about the current patient issue, assessment of the patient including vital signs (temperature, blood pressure, heart rate, respiratory rate) as well as physical symptoms of labored breathing and statements by the patient as to how she was feeling. This exercise brought them to the conclusion to change the IV solution as a result of their assessment and then reassess the blood glucose as well as notify the physician of the event. In addition, information about what other solutions could be useful are shared between the students as they critically think about what just happened, since the “observers” along with the instructor are participants by viewing what is happening in the scenario through the use of video streaming from the patient room. What happened next was that the students realized what they needed to do to solve the problem was to assess the situation and the patient (with the environment) gather all the facts, critically think about a possible solution and then act on their decision. At the end of the scenario a debriefing took place in which students shared with each other the thinking steps they took to arrive at a reasonable solution as “the nurse.” This simulation teaches them to use critical thinking in this scenario. In the end, the patient survived in good condition because the students used their CT skills to devise a plan for treating the elevated blood sugar that evolved during the scenario. They learned to apply their thinking to the problem at hand and process the situation for future application in their nursing role.*

Although the nursing student in this scenario demonstrated sound critical thinking as she engaged in the clinical decision-making process, the evidence from research on

critical thinking (CT) among nursing students is not nearly as positive. CT skills such as analysis, inference, and so on have been shown to be underdeveloped in nursing students (Ellerman, Kataoka-Yahiro & Wong, 2006; Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009; Paul, 2014;). For example, Fero et al. found only 74.9% of the new nurses who participated in their study met expectations that indicated strong CT skills. Thus, 25% of the new nurses, graduates of nursing programs, were lacking skills in CT, determining urgent problems, acting independently to intervene, reporting significant clinical data, and providing appropriate rationales for clinical decisions. Additionally, Paul (2014) found nursing students (or nursing graduates) lacked necessary CT skills and required additional student time for clinical decision making.

Importantly, several professional organizations and other researchers have recognized the prominence of CT in clinical decision making. For example, the American Nurses Association (ANA, 2003) published a social policy statement citing CT as an essential attribute of nursing in the application of scientific knowledge to clinical practice. Moreover, the American Association of Colleges of Nursing (AACN, n.d.) recognized CT as a crucial component in the preparation of nurses for professional practice. In her seminal work on thinking like a nurse, Tanner (2006) cogently argued that reflection, a key component to CT, was essential to improving nursing care. Brunt (2005) also wrote about the importance of CT in nursing practice and discussed strategies for developing CT. Brunt concluded her work by maintaining additional work on CT was “needed to explore how the process of nursing practice can nurture and develop CT skills” (p. 260). These prominent authorities in professional nursing and nursing

education supported the educating nurses in their generalist programs with CT skills that could be applied toward safe effective patient care.

### **Situated Context**

A major feature of our nursing program has been the use of “nursing process” as a tool for student nurses to assimilate information, synthesize it, and make an informed decision that served the best health care interest of the patient. The nursing process has been taught directly to our nursing students and has been an integral part of clinical decision reasoning that has been part of my daily practice as a nurse educator. Further, the nursing process has been shown to involve a critical thinking (CT) component in which nurses make clinical decisions based on patients’ responses to their illnesses. Inherent in the CT process is the student’s ability to think critically about the situation and what problems this presents for the patient.

For 12 years, I have taught juniors and seniors in a baccalaureate, pre-licensure nursing program, at a major university in the southwestern United States. Using standardized laboratory simulation scenarios students have learned clinical reasoning skills and applied them to the standardized simulated (SIM) patients before applying the skills in clinical practice with actual human patients. The simulation laboratory has been a nationally accredited simulation center dedicated to teaching nursing skills and critical thinking applications allowing nursing students to perform clinical decision making while learning to provide patient care. As part of the program, prepared simulation scenarios have been presented to all undergraduate nursing students. The clinical instructor and the simulation nurses observed the students during the scenarios each week. A debriefing

session for all 10 students in a learning community has been included in each simulation session moderated by the clinical instructor in attendance.

According to Heaslip (2008), “In nursing, critical thinking for clinical decision-making is the ability to think in a systematic and logical manner with openness to question and reflect on the reasoning process used to ensure safe nursing practice and quality care.” A serious problem noted anecdotally in local hospital clinical education departments, and supported in the research literature is the underutilization of clinical reasoning with limited application in nursing practice (del Bueno, 2005). In the next section I outlined and illustrated the practice problem and purpose of the research project.

### **Problem of Practice and Purpose of the Project**

The identified problem for this research investigation was that nursing students were not applying CT skills in planning care for their assigned patients in their undergraduate nursing program. Utilization of textbook and online literature has been expected of students in the nursing program as they develop and implement care to achieve beneficial health outcomes for the patients. Unfortunately, nursing students have not clearly demonstrated their abilities to plan safe, appropriate care for their patients that will help the patients achieve improved health outcomes.

Additionally, faculty have been tasked with creating and utilizing imaginative, state-of-the-art teaching strategies that engage students, teach concepts within the content, and help support students’ abilities to communicate. Attainment of all these objectives has been challenging given current course and content loads, and time limitations (Moorman, 2015). The purpose of the study was to examine current clinical reasoning skill development in undergraduate nursing students and support the

development of CT skills during clinical instruction. A second related purpose of the study was to foster baccalaureate nursing students' acquisition of CT skills that could be applied as they (a) engaged in clinical reasoning skills during course simulations and (b) constructed reflective journal entries related to their clinical simulation exercises. It was anticipated that these processes would enhance students' application of these skills to their clinical decision making processes.

### **Initial Research Informing the Study**

In the initial research cycle in fall 2013, I conducted reconnaissance to inform my research. Specifically, I conducted a brief survey with a mixture of open- and closed-ended questions in an email asking five nursing faculty members about their thoughts with respect to CT. The results of this survey showed respondents had slightly differing definitions of CT, but all agreed that the process was a necessary skill for nursing students to develop. Of these faculty members, four of five agreed that they did not feel that they had the skills necessary to teach CT as a skill. These faculty members as a group were not satisfied about how CT and clinical reasoning have been taught in our nursing program.

A second set of questions was used to interview another group of four faculty members in a focus group setting. During the focus group discussion we had a list of questions that were discussed in detail. The set of questions was emailed to the group prior to their participation in the focus group. The questions focused on how faculty members taught students about CT and fostered students' knowledge of CT skills in the program. The results of this focus group were similar to those from the survey. This group of faculty members generally felt that CT was a useful skill that nurses used to



gather data, which was then analyzed and applied to patient health problems, and finally evaluated and revised for documenting progress to help patients to improve and achieve optimal health outcomes.

### **Research Questions**

Research questions have changed slightly over time and have become more focused and exhibited more depth. Nevertheless, they still were rooted in my initial questions and have been modified to reflect previous work. The following three research questions guided the conduct of the present study.

1. How and to what extent did implementation of teaching the inference critical thinking subskills influence students' acquisition and application of CT skills and clinical reasoning?
2. How and to what extent did the implementation of self-reflection about CT skills during simulation activities influence students' acquisition and application of CT skills?
3. How did the research study influence my abilities as a nursing educator?

## CHAPTER 2

### THEORETICAL PERSPECTIVES AND RESEARCH GUIDING THE PROJECT

In this chapter, I have presented definitions of key concepts, a focused literature review, and a description of previous research work that I have conducted. In the initial section, operational definitions of key concepts have been provided. The review of the literature included appraisals of (a) theoretical frameworks on critical thinking and mediated learning that informed the study and (b) the convergent parallel mixed methods design, the method employed in the study. Additionally, I have presented information on previous research work that is relevant to the conduct of the dissertation study.

#### **Operational Definitions of Key Concepts**

*Critical thinking* was defined as rational, focused, thoughtful assessment, regarding what ideas to accept or actions to perform. CT has been prevalent throughout the daily human experience. In CT, individuals analyzed data, decoded events and situations, or appraised claims. In the dissertation, the work of Facione (1990, 2015) heavily influenced the perspective taken on CT, which included six core skills such as (a) interpretation, (b) analysis, (c) evaluation, (d) inference, (e) explanation, and (f) self-regulation. Based on assessment, analyses, interpretations and evaluations, nurses have drawn inferences and engaged in thoughtful decisions about evidence as they developed plans for implementation of a care plan.

*Clinical reasoning* in nursing was considered to be a form of CT in which nursing students drew on patient symptoms during clinical situations and developed inference skills for application in patient situations. In particular, it involved the first three steps of the nursing process—(a) assessment, (b) diagnosis, and (c) planning. Thus, as Junior

level nursing students considered care for a patient, they employed inference skills such as questioning the evidence, hypothesizing about alternatives approaches, and developing plausible solutions. See also the definition of inference, which follows this definition.

*Inference* was defined as a skill that nursing students developed as they moved through the nursing program. Junior level students have developed very rudimentary abilities to use inference which involves several subskills including (a) querying evidence, (b) conjecturing alternatives and, (c) drawing logically valid conclusions. Querying evidence meant Junior level nursing students carefully, thoughtfully, and systematically examined all the evidence provided in a simulation. Conjecturing about alternatives suggested students must have developed a hypothesis(es) about the patient's situation related to the evidence that has been presented. Finally, they must have weighed all the evidence and considered the hypothesis(es) to draw logical conclusions about the patient's situation. Because of the critical importance of inference skills to the Nursing Process, the focus of the intervention in this dissertation was on more fully developing these three subskills.

*Nursing Process (NP)* was considered to a method of practice that involved five steps: (a) assessment, (b) diagnosis, (c) planning, (d) implementation, and (e) evaluation. Each step of the NP was important as nursing students make decisions about implementing safe patient care. Junior level students required guidance from the instructors to develop their skills in nursing process. During simulation exercises students, guided by their instructors, employed the first three steps of nursing process to make sense of the patient's clinical situation to provide safe basic nursing care.

*Mediated learning* was defined as learning that was guided by a teacher or more knowledgeable other, which was seen as being integral to clinical nursing education. In particular, instructors used large amounts of discourse and dialog to facilitate the learning process.

*Mixed methods* was an investigative research approach that combined both qualitative and quantitative research methodologies. It included theoretical assumptions, use of qualitative and quantitative procedures and the integration of both approaches within a single study.

*Simulations* were written patient care situations developed by faculty members using high fidelity technology and individual or group participation in clinical educational settings. These situations were standardized or customized depending on the presentation to the students.

In the next section I review the theoretical perspectives that guided the study.

## **Theoretical Perspectives**

### **Critical Thinking**

In writing about CT, Facione (1990, 2015) described a cognitive dimension of CT, which included six core skills. Facione claimed the central core skills of CT included (a) interpretation, (b) analysis, (c) evaluation, (d) inference, (e) explanation, and (f) self-regulation. The six core skills and subskills of CT described by Facione are presented in Table 1. These skills once learned “have applications in all areas of life and learning” (p. 8). This was especially true for nursing because CT played an important role in clinical reasoning, which was central to the NP. Although these six skills cannot be taught as a separate body of knowledge, instructors have infused them into the educational process to

be applied in realistic nursing simulation scenarios. In his exposition of CT, Facione (2015) declared,

The identification and analysis of CT skills transcend, in significant ways, specific subjects or disciplines, learning and applying these skills in many contexts requires domain specific knowledge. This domain specific knowledge includes understanding methodological principles and competence to engage in norm- regulated practices that are at the core of reasonable judgments in those specific contexts. (p. 10)

Table 1

*Facione's Model of Critical Thinking Including Core Skills and Subskills*

Core skill	Skill interpretation	Subskill
Interpretation	Express meaning of criteria being examined	Categorize Decode significance Clarify meaning
Analysis	Identify inferential relationships and conceptual elements	Examine ideas Identify arguments Identify reasons and claims
Inference	Secure elements needed to draw conclusions and form hypotheses	Query evidence Conjecture alternatives Draw logically valid conclusions
Evaluation	Assess credibility and strength of evidence supporting judgments and actions	Assess credibility of claims Assess quality of arguments that were made using inductive or deductive reasoning
Explanation	Justify process utilized in CT	State results Justify procedures Present arguments
Self-regulation	Consciously monitor cognitive activity for relevance and validity	Self-monitor Self-correct

*Note.* Adapted from *Critical Thinking: What it is and Why it Counts*, by P. Facione, 2015, p. 10.

Within each of these six major skills of CT, as seen in Table 1, Facione suggested there were attendant subskills, which must be learned and incorporated into students' skill sets to support the six core skills and the development of CT. Of particular interest for the current project was inference, which was directly applicable to nursing students. For the CT skill of inference, the set of subskills outlined by Facione included (a) querying evidence, (b) conjecturing alternatives, and (c) drawing conclusions, which were essential to critical thinking. These subskills were described in more detail in the definitions of key concepts presented above.

CT skills have been viewed as being especially important for nursing students to learn and apply to make competent clinical decisions to promote safe, positive health outcomes for their patients. In today's healthcare environment nurses have been challenged to use evidence on which they base their clinical care decisions beyond the provider's orders. Thus, using CT skills such as interpreting criteria, analyzing the connections between concepts; evaluating credibility and strength of evidence in support of their judgments, etc. have been critical for making informed, appropriate decisions.

In particular, the role of inference and its attendant subskills—(a) querying evidence, (b) conjecturing (about) alternatives, and (c) drawing logically valid conclusions have played an essential role in using CT in clinical decision making situations. Thus, these three subskills were the focus of the research project. Time to focus on these subskills was established during the clinical teaching in the Sims to aid student nurses in development of these three inference subskills.

**Critical thinking in nursing.** Nurses have used CT as part of their problem solving techniques to develop interventions that were safe and appropriate for patients. Developing CT skills in nursing education has been complicated by a delicate balance that students must undertake to grasp the clinical reasoning process and learn patient care skills that involve a high level of complexity unique to each patient's needs.

Benner, Sutphen, Leonard, and Day (2010) alluded to the necessity of highly performing nursing educators in cognitive learning situations where students were placed to develop the complex clinical thinking and reasoning that have become an integral part of professional practice. They defined clinical reasoning as the ability to analyze a clinical state as it unfolded while simultaneously considering patient and family needs. In this reasoning process, student nurses must have learned to prioritize their actions and made reasonable judgments about the patient's care to promote safety. Facione and Facione (2008) suggested recent studies in human reasoning showed nurses actually utilized two systems of thinking, which employed "highly expeditious heuristic maneuvers which can yield useful response to perceived problems without recourse to reflection" (p. 5) and a reflective problem-solving method of critical thinking. As student nurses execute clinical reasoning, they must have taken into account interpretation of patient symptoms as they explored the meaning of symptom characteristics, which modified their meaning and resulted in differential treatments. Thus, each situation has had within it conflicting challenges for nurses' clinical thinking skills.

Hagan (2005) examined CT among nursing students in an experimental study. The results of this study indicated there were no significant differences between experimental and control groups on CT after the first semester of the nursing program.

He explained, although the need for CT in nursing programs was great, there was considerable difficulty defining and measuring CT in entry-level students.

**Critical thinking and clinical reasoning.** CT during the nursing process has been shown to involve a component in which nurses use clinical reasoning to make clinical care decisions based on patients' responses to their illnesses (Facione & Facione, 2008). Inherent in the CT process was the student's ability to think critically about the situation and what care problems this presented for the patient. Paul and Elder (1999) described CT as "essential to and made manifest in all academic disciplines including sound reasoning and expert performance in . . . all professions" (p. vii). Paul (1990) suggested components of CT included "disciplined, self-directed thinking that displays a mastery of intellectual skills and abilities" (p. 545). Moreover, with respect to clinical reasoning, Facione and Facione (2008) cogently argued CT was an integral part of clinical reasoning, which required students to apply inner thoughts about what the clinician believed regarding patient symptoms.

Subsequent, nurse-developed interventions were designed to improve patient outcomes and regain optimum health status. Thus, the authors claimed clinical reasoning involved a complex set of thinking skills that students must have acquired, and developed before entering professional practice. According to Facione and Facione (2008) CT was a method that was used to make a determination about what to consider and how to treat the symptoms a patient was presenting. This included the use of cognitive capabilities and thoughtful inquiry, which resulted in valid clinical decisions.

Clinical reasoning, which was closely related to the nursing process, has been generally defined as a standardized process of patient assessment and patient problem



discovery associated with patients' healthcare that results in planning interventions to assist patients in regaining optimum health. Tanner (2006) defined clinical reasoning as "the processes by which nurses make their judgments" as they use intentional methods of constructing choices to select the best option available. Tanner also suggested this process "might be characterized as engaged practical reasoning" (p. 207). CT has been viewed an integral part of clinical reasoning involving a complex set of thinking skills that students must have acquired, and developed before entering professional practice.

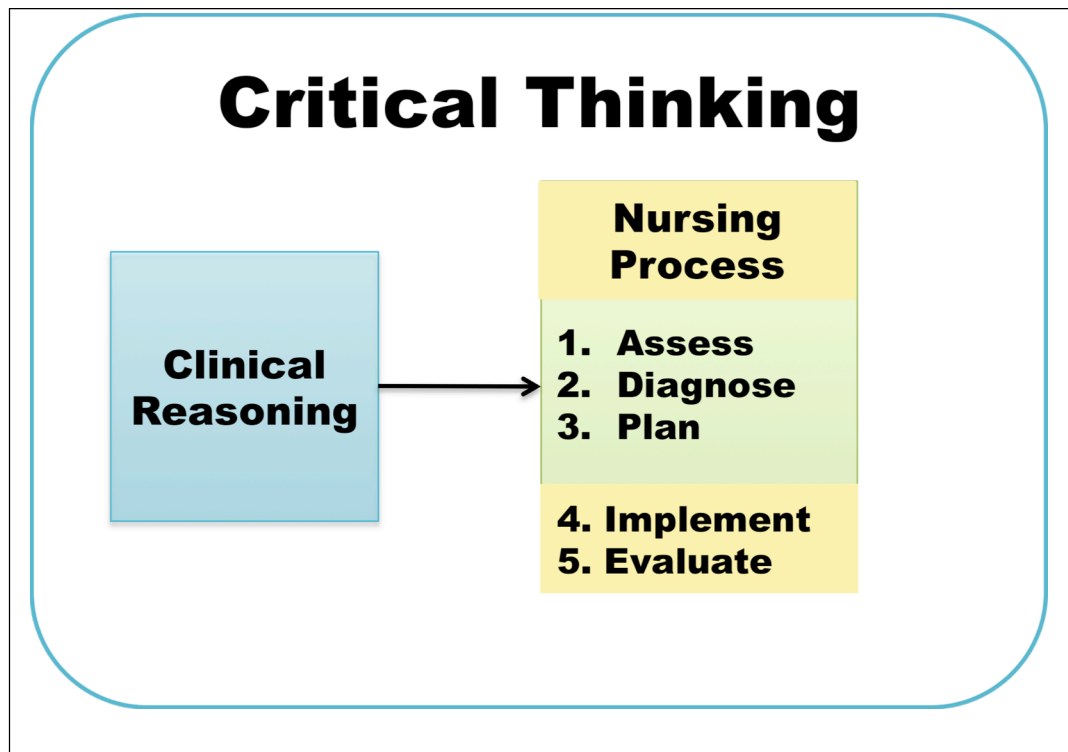
Various research efforts based on Tanner's work about thinking like a nurse have been conducted. Capelleti, Engel, and Prentice (2014) performed a systematic review of literature to study the results of work done regarding clinical judgment and clinical reasoning in nursing that have emerged since Tanner's investigation in 2006. The authors searched numerous electronic databases to find primary research studies about clinical judgment and clinical reasoning in nursing. Their results showed about fifteen studies that were evaluated using Tanner's paradigm. The results demonstrated support for Tanner's original model, although experience in clinical reasoning and judgment still has not been well understood. In other literature, researchers have expanded nursing knowledge creating and using instruments to improve these skills in both nursing students and practicing nurses. Finally, the authors proposed that further development of CT and clinical judgment in nursing education was warranted and that progress in better understanding clinical judgment might be made by also considering the influence nurses bring into the situations as they helped to solve health issues and promoted positive outcomes for patients.

Moule, Wilford, Sales, and Lockyer (2008) conducted a two phase mixed methods study. In the first phase, Moule et al. examined whether simulation could reinforce progression of clinical skills among pre-licensure nursing students. In the second phase, the authors gathered mentors' views and experiences using simulation in educating nursing students for future professional practice. The study was completed in the United Kingdom and was reported as one of 13 pilot sites using assigned simulation exercise experiences. Phase 1 included a sample of 69 students studying at one university. Students completed pre- and post-tests in basic life support and manual handling, vignettes, and objective structured clinical examinations (OSCEs) covering specific areas in simulation. Phase 2 included interviews with mentors supervising study participants. Results of this study showed that students and mentors re-acted positively to simulation experiences. They concluded simulations offered a capacity for interdisciplinary learning that could be broadened to inter-professional roles. The study also identified the use of simulation for collaborative work between academic educators and clinical professionals. Finally, the study showed the powerful benefits of using CT skills to develop clinical judgment both in nursing students and other healthcare professionals.

In another study, high-fidelity simulation was explored to understand the connection between theoretical knowledge and practical skills. The simulation environment provided a safe and realistic atmosphere to promote students' cognitive capabilities. Debriefing following the simulation experience provided participants the opportunity to analyze and reflect upon their decisions, actions, and results. A three-step, post-simulation reflection model was used. Nursing students participated in written and

verbal reflections, which were analyzed qualitatively. The authors suggested this model focused on peer learning through a student-centered approach. The findings in this study pointed to the effectiveness of individual reflection after high-fidelity simulation, which was directly applicable to the current study.

Taken together the research on CT, CR, and NP suggested a model of their interrelations, which has been depicted in Figure 1, below. In Figure 1, the influence of CT on CR, as it is conducted in NUR 323, and its influence on carrying out the first three steps of the NP are clearly evident.



*Figure 1.* Model of Relations among CT, CR, and NP

In the study, simulation was useful in allowing the instructor to present standardized patient situations to all Junior level students, which were used to increase their CT inference skills that were essential as students navigated the first three steps of NP.

**Effect of Simulation on CT.** Simulation as a pedagogy in nursing education has been found to promote CT in nursing students. Although instructional methods have varied among educators, there has been a common thread in education today that no matter what level of student (entry level to advanced practice), the general consensus has been that high-fidelity simulation had a positive effect on students' CT (Becker, 2007; Soucy, 2011). There have been a limited number of studies that actually measured CT during planning and decision making by nursing students. Becker (2007) used high-fidelity simulation to study CT in advanced practice nursing students. The results showed that patient simulation increased CT during planning and evaluation stages of patient care. Adams, Stover, and Whitlow (1999) examined CT in senior-year, traditional baccalaureate nursing students. Their findings showed a statistically significant difference of students' CT skills during the last semester of their nursing program. Although students perceived an increase in CT skills, the data indicated that thinking skills of inference and deduction were increased, but there was no improvement in recognition of assumptions, interpretation, and evaluation of arguments. As a result, Adams et al. suggested faculty members could manipulate course objectives and teaching styles to enhance CT outcomes. In a more recent study, Soucy (2011) found an increase in CT scores, but no significant difference in self-confidence scores. Frequently, the conclusion of the researchers was that additional study was needed to investigate the effects simulation had on CT and clinical reasoning (Soucy, 2011).

Sadideen and Kneebone (2012) maintained simulation was an “excellent adjunct to surgical education” (p. 400). They contended simulation was important to support skill acquisition. Further, they argued that providing earlier stages of teaching outside of the

clinical arena allowed for mastery of these skills prior to use with human patients. Patients' needs take precedence over students' learning requirements, thus the working environment has not always been conducive to learning because of reduced time on task. As a result, simulation has had the effect of enhancing student confidence and effecting increased patient safety (Sadideen & Kneebone, 2012). Kneebone's (2005, cited in Sadideen & Kneebone, 2012) work on simulation indicated this kind of learning promoted "access to expert tutors; [who] should provide a supportive, motivational and learner centered milieu that is conducive to learning" (p. 400).

### **Mediated Learning**

Lev Vygotsky (1978), a noted Russian psychologist developed the sociocultural approach to learning. In this approach, Vygotsky described what he called "mediated learning," learning that resulted when adults or more knowledgeable others (MKO) such as teachers "came along side" the student in her environment and facilitated learning through the extensive use of discourse, "talk" directed at the learning process that facilitated learning. For example, MKO discourse might have included providing information about content or a topic; asking questions to "steer" learners' thinking; or providing clarification. Importantly, to be effective, all of these MKO efforts must have occurred within the zone of proximal development (ZPD), an area of learning just above students' current level of understanding to facilitate powerful learning by the students. I will return to the concept of ZPD a bit later in this section.

Kozulin and Presseisen (1995) compared Vygotsky's mediated learning to direct learning in which students interacted directly with the environment to acquire knowledge. Importantly, Kozulin and Presseisen noted, "The mediator selects, changes, amplifies and

interprets objects and processes for the child” (p. 67). The application of this idea to the current proposed study was self-evident because the learning process of the student who interacted with the clinical instructor who served as a mediator of the clinical environment was parallel to the application provided above. Critically, the instructor drew upon her expertise and decided what clinical experiences were most appropriate for the nursing student to have the best possible experience as preparation for professional practice.

Further, Vygotsky referred to the material tools of learning as the collectively used, interpersonal communication with symbolic representation (Kozulin & Presseisen, 1995). Vygotsky suggested two possible approaches that influenced learning. The first was how learning took place on two levels, first on a social level, and then it was internalized on an individual level (Kozulin & Presseisen, 1995). A second approach previously mentioned was the important influence of the other individual as a mediator of meaning, which was closely linked to Vygotsky’s emphasis on language’s symbolic function. Thus, the mediator served as a carrier of signs, symbols, and meaning. In nursing preparation, the mediator was the clinical instructor who provided meaning to the language and healthcare problems students encountered in their clinical experiences.

Karpov (2014) who also examined Vygotsky’s influence on our understanding of learning wrote about Vygotskian notions of mediation as a major determinant of learning and development. Karpov discussed how humans used mental activities as methods of adaptation to the world. Further, Karpov suggested Vygotsky clarified the importance of the connection between practical activity and mental processes and their influence on subsequent learning. Importantly, this practical activity was embedded in a social context

(Smagorinsky, 2013). For example, learning in clinical settings has taken place within a larger social context of the learning within the whole nursing education program. Smagorinsky further claimed Vygotsky insisted that “knowledge of abstracted rules must work in conjunction with experiential knowledge” (p. 241). According to Smagorinsky, Vygotsky promoted the idea that the meaning of concepts was derived through “an individual’s understanding of the concept as well as the social method of engagement with the larger community in which the meanings of concepts have gained a sense of acceptance and stability” (p. 242). Thus, concepts about patient care and clinical reasoning were embedded in the much larger social framework of today’s health care environment.

### **Zone of Proximal Development**

As noted previously, the Zone of Proximal Development (ZPD) was a critical concept in Vygotsky’s theory and in applications of his theory to educational settings (Gredler, 2009). Gredler noted increasing interest in Vygotsky’s work especially the work on the ZPD, which was critical in “the creation or appropriation of symbols to gain control and master a cognitive process or capability” (p. 7). Thus, working at the appropriate ‘cognitive level’ of the learner was critical for learners’ to attain new understandings.

Sadideen and Kneebone (2012) drew upon the idea of the ZPD when they claimed, “Vygotsky’s zone of proximal development [provided cognitive space] within which the learning could progress in problem solving in collaboration with more capable peers, even if [an individual was] unable to do so independently” (p. 399). They also suggested “each learner has his/her own ZPD and that some individuals begin on a higher

plane than others. This supports the idea of ‘scaffolding’ temporary learning support by an expert tutor” (p. 399). Thus, for example, an accomplished instructor can institute appropriate frameworks, scaffolds, to support learning and allow the student(s) to accomplish learning in their own ZPD. Varying levels of support could have been provided to each student depending on their learning needs and prior level of knowledge. The ZPD or “comfort zone” (p. 399) for learning allowed the student to gain experience that could advance her skill prior to attempting such skills with human patients.

### **Reflection**

Sadideen and Kneebone (2012) further contended that reflection was a retrospective activity, which was important for the development of the student to achieve maximum success with skill acquisition. Specifically, reflection required the student to examine her current understanding or skill level by evaluating her current performances and making determinations about what to improve and how to improve it. Thus, reflection has been shown to be a crucial skill in development of higher levels of knowledge of nursing content and skills.

In the initial work on reflection, Schön (1983) suggested it played an especially powerful role in influencing professional practice. Specifically, Schön proposed that improvements in practice-based disciplines like nursing and education came about as professionals re-examined their efforts as they attempted to improve their practice.

In later work on nursing, Tanner (2006) advocated the use of reflection on practice as a means to assist nursing professionals to further develop their clinical skills. Tanner said a ‘break down’ in practice and questioning about what could be done better



caused professionals to consider how to improve their professional practices and skills for the future.

In this study, student participants completed reflections as part of the requirements for the course to facilitate improvement of their clinical reasoning skills and further develop their professional practice abilities. These reflective journal entries were a portion of the qualitative data in the study.

### **Research Design for the Proposed Study**

Research designs have been used for collecting, analyzing, interpreting, and reporting data. These were beneficial for guiding researchers' decisions and they promoted the logic for interpreting and analyzing data for study outcomes. Plano Clark and Creswell (2011) eloquently described the process of researchers' design choices. In the sections that follow I discussed the rationale for choosing the Convergent Parallel Mixed Methods (CPMM) design for the research study. Note: In an earlier edition of their 2011 book, Plano Clark and Creswell (2003) called the CCPM design the Concurrent Triangulation design. Following the rationale, I have described the purpose, strengths, and procedures of the CPMM design.

### **Rationale for CPMM**

Choosing the CPMM design was appropriate for the proposed study because it involved determining the relation between quantitative and qualitative data. Matching the appropriate design to the research problem provided the operational logic and framework that supported high quality, rigor, and a persuasive study. This study The CPMM design made use of quantitative data collection, surveys, and analysis and was designed to relate this to the qualitative data collection,(journals and interviews, to provide the depth

required for accurate data interpretation of a within-participants examination of critical thinking among Junior level nursing students (see Figure 2 below).

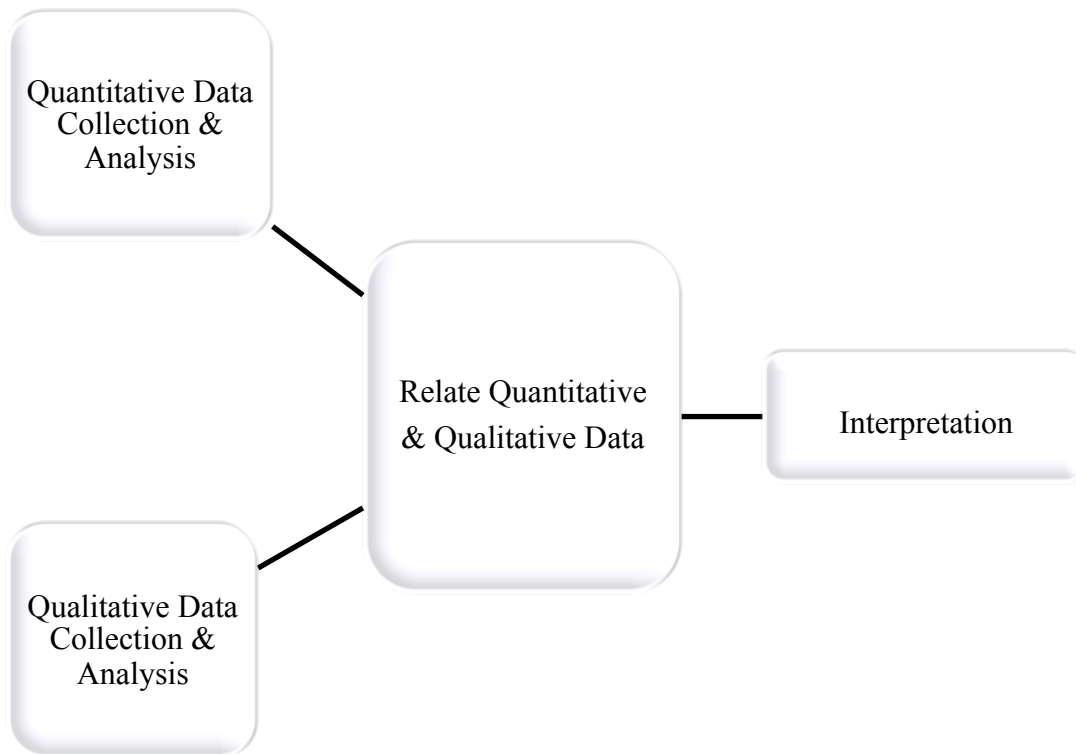


Figure 2. Convergent parallel mixed methods design. Adapted from *Designing and Conducting Mixed Methods Research* (2<sup>nd</sup> ed.), by V. L. Plano Clark and J. W. Creswell, p. 69).

### **Purpose**

The purpose of this design was twofold: (a) to provide complementarity between the qualitative and quantitative data collected, and (b) to provide a deep understanding of the internal process of clinical reasoning in Junior level students. The intent inherent in this design was to bring together the different strengths of both methods in a small, timely study. This method included triangulation of these methods by directly relating quantitative statistical results with qualitative findings for corroboration and validation

purposes. Other purposes for using this design specific to this study were to synthesize complementary quantitative and qualitative results while developing a more complete understanding of how CT influences CR in Junior level students during simulation exercises in NUR 323.

### **Strengths**

The advantages and strengths of this design included (a) intuitive process; (b) time efficiency for data collection, analysis, and dissemination of results; and (c) independence of each type of data collection using traditional methods. In nursing, it has been imperative for professional nurses to consider all facts with respect to patients' situations. This design complemented this process for exploration of the internal processes of thinking useful for Junior level students. Efficiency for data collection provided for collection of a large amount of data in a brief timeframe which was beneficial to capture a just-in-time expression of thinking processes during simulation events using both quantitative and qualitative methods. The independence of the data collection allowed for the potential for both quantitative and qualitative methods to be explored and utilized while merging these two sets of data for interpretation to provide a comprehensive approach to answer the research questions.

### **Convergent Parallel Procedure**

Plano Clark and Creswell (2011) outlined the application of the CPMM design in four steps, which aligned with the proposed study procedures. These steps have been described below.

1. Data collection of both quantitative (surveys) and qualitative (journals and interviews) is concurrent but independent of each other.

2. Data analysis of two data sets is separate and independent of each other using standard quantitative and qualitative methods.
3. Locate data interface, and merge results from two independent data sets to relate results during additional analysis.
4. Interpretation of analysis to discover convergence, divergence, and how data sets relate in combination for comprehension of study results to answer overall purpose of the study and to answer the research questions.

### **Previous Research Results**

Because several faculty members left the nursing program, the focus of my work changed. The research focus was changed from previously studying faculty members teaching of CT to understanding how the students learn to apply CT skills in clinical reasoning to make sound judgments in their clinical decision making for their patient care. Using simulation in our nursing program has helped students develop their skills in noticing, interpreting, implementing interventions, and evaluating nursing process clinical decision making outcomes. In reviewing the literature, I found that no matter how the teachers were teaching CT, the practice problem continued because students did not make the connection between CT, clinical reasoning, and planning patient care. So, I wanted to examine more closely students' thinking processes and how they connected information they were learning to their clinical reasoning processes. In trying to find these answers I considered this new focus of the students' thinking process, their perceptions of clinical reasoning and the skills that allowed them to move from data presented to them to their decisions. As a result, the focus of the project has moved to examining the development of three inference subskills.

Moreover, based on a preliminary study, a new, much shorter CT instrument was developed for use in the project because as noted in what follows the previous instrument was too complicated and too long. Results from the pilot study showed that students did not have the time to complete the Health Sciences Reasoning Test (HSRT). Data was wholly incomplete because only four students participated in the first survey and none participated in the second. Two reflective journals were written by each participant about the simulation experience, however these were found to not be useful because within-participant data was incomplete. Having learned this valuable lesson about participants, a decision to develop and implement a new survey instrument was undertaken.

In the following chapter I discuss the mixed method approach conducted in this research project that used quantitative surveys, qualitative student reflective journals, student interviews, and a researcher journal.

## CHAPTER 3

### METHOD

The purpose of the study was to support baccalaureate nursing students' acquisition of CT skills related to inference to enhance students' application of CT to their clinical reasoning. In this chapter, I describe the setting, participants, role of the researcher, intervention, instruments, procedure, data analysis methods, and potential threats to validity.

#### **Setting**

Faculty members have taught undergraduate nursing (pre-licensure) within the junior/senior years of baccalaureate university studies at a major university in the southwestern United States for decades. Using laboratory simulation scenarios students have learned critical thinking and clinical reasoning skills and applied them within the standardized simulated (SIM) patient scenarios before demonstrating the principles in clinical practice with human patients. This process has promoted both emotional comfort for the student to acquire new skills and practice these skills in an educationally safe environment, which has also promoted patient safety. The simulation laboratory was a nationally accredited simulation center dedicated to teaching nursing skills and critical thinking with clinical decision making to all undergraduate nursing students in the program. These students have been exposed to the nursing process and clinical reasoning theories for long-term care patients during their first semester.

During the second semester, the Adult Health Nursing Practice course has been focused on acute alterations of adult health, which predominantly occurs in hospitalized patients. As part of their coursework in the program, students have been taking NUR 323,

which was designed to foster clinical decision-making skills and advanced nursing care management skills among these pre-licensure nursing students. During each seven-week clinical rotation there were five weekly simulation sessions in which students were presented with standardized patients using common acute care themes. Students prepared for each session in advance, and worked collaboratively with their clinical instructors and peers during the simulation (SIM) laboratory sessions. Each group consisted of eight to ten students and one clinical faculty member. Simulation scenarios proceeded in a simple to complex manner through each of five weeks of clinical lab sessions.

All groups of students were required to participate in the simulation scenarios and documented their assessments and findings in a student version electronic medical record (SIMCHART). Use of simulations was designed to foster the development of clinical reasoning skills in nursing students. Nevertheless, the data indicated students lacked capabilities for utilizing CT, which adversely affected their in-patient assessments, formulation of nursing diagnoses, and planning and implementation of interventions sufficient to provide safe care. Each week during the rotation, students gathered in the simulation lab in their learning community with their clinical instructor and a simulation nurse. Each student interacted with a high-fidelity manikin patient during a two- to four-hour timeframe. Each interactive session involved having the high-fidelity manikin respond much as a patient would in similar circumstances. Usually four to five short scenarios were presented to students with the simulation nurse operating all of the technological instruments including the voice of the manikin. The simulation nurse was located in a small control room that had a microphone and computerized technology connected to all physical attributes and audio capabilities of the manikin as well as

medical monitoring equipment to produce the interactions with the students. The control room had viewing capability both into the patient room where the manikin was located and the debriefing room where the clinical instructor and students who were observing the particular scenario were located. Students in the manikin patient room were not able to view the control room from this location. The audio capability of the SIM nurse extended directly from the manikin as though this patient was interacting with the students.

The manikin-patient room was a replica of a hospital room that had a wall monitor to provide visual and audio components to the student participants for cardiac, respiratory, and vital signs such as temperature, pulse and respirations, oxygen saturation monitoring as well as oxygen and suction equipment, which was very similar to what students saw in their clinical agency experience. The manikin was an anatomically correct human patient simulator, which could be programmed to respond physically and verbally to nursing actions of the students as the scenarios progressed. Typically the manikin presented physical assessment quality audible heart and lung sounds as well as peripheral pulses, blinking eyes, and pupils that constricted appropriately to light. Medical equipment such as intravenous lines, urinary catheters, and other adjunctive equipment such as sequential compression devices or anti-embolism stockings could also be connected to the manikin patient. To promote a sense of realism to the participants, each manikin patient had a full name, background history, and A general family story as well as cultural information available to the students for review. The manikin patients also could be shown to be Caucasian, African American, or Native American including the hue of their skin.



The debriefing room had a large conference table with 12 chairs and computerized projection equipment useful for viewing the scenarios in the manikin room. There was a white-board on the wall where students could write details of the patient care maps developed by each group, during the scenarios. In addition, there was a telephone that provided interactive calling between rooms should the student be required to call the licensed provider, instructor, or SIM nurse, of the manikin-patient for additional orders or reporting their findings and providing recommendations for additional patient needs to said provider.

Further, students used their own laptops during the sessions to access online simulated electronic medical records for which they had purchased access codes required as part of their textbook costs. Students utilized this program to document their notes in the patient chart that had previously been set up by simulation staff and the simulation coordinator.

### **Participants**

The participants for the study included a pool of about 53 junior students, who were enrolled in the second semester of their junior year in a pre-licensure nursing preparation program. This sample was a convenience sample of students participating in all sections of a course, NUR 323 (during each Session A and Session B) in fall 2016. Generally, these students were 18 to 50 years of age. About 90% of them were female, and about 10% were male. Although residency statistics were not officially available, there were students who attended school from Arizona, the U.S., and international students from a multitude of countries. In addition, many students were first-generation college students from many varied socioeconomic backgrounds. Students who had been

accepted into the program currently must have attained a 3.20 GPA or higher. The students were exposed to the nursing process and clinical reasoning theories during their first semester for long-term care patients. During their first junior-year semester the students also participated in a limited simulation experience for a simulated long-term care patient, which provided an introduction to the simulation laboratory experience.

Prior to conducting the study, IRB approval was obtained. The approval is provided in Appendix A. Students received a recruitment and consent form and either chose to participate or not participate in the study.

CT skills were not officially taught in clinical or laboratory sessions. Nevertheless, students were expected to learn to handle patient-centered problems that affected the individual's health. As a result, students were faced with a discontinuity for learning between theory and practice (Benner et al., 2010). The separate didactic and clinical classes were all considered valuable, but there was a substantial amount of content in the given timeframe for these classes that students must have assimilated in order to pass the courses. This has been a far from productive situation because the knowledge gained in theory served as a backdrop to application knowledge, but it did not prepare students to utilize this knowledge in practice. According to Benner et al., clinical reasoning was a goal, which the educator was to impart to the student. This meant that students must have a capability to reason about a clinical event as it developed, as well as taking account of how patient and family needs might have influenced nursing care decisions.

## **Role of the Researcher**

The project involved the nursing faculty and undergraduate students with the teacher being a facilitator to the nursing faculty and the nursing students. Fine et al. (2003) encouraged the use of local resources to achieve a durable outcome. Using one faculty member as instructor for 8 to 10 students has been a standard in nursing education for decades. Unfortunately nursing education has evidenced some discontinuities because individual teachers preparing nursing student groups may use slightly different methods across faculty members, which may be confusing for students. Using models of CT within the nursing process to achieve positive health outcomes for patients has become another requirement for educators today (Benner et al., 2010). Students seemed to attach a high level of importance for skills they perceived as “working like a real nurse,” such as working with advanced technology versus using skills for patients needing bathing and wound care.

My role as a nurse educator allowed me to be an insider and a leader within the learning community assigned to me. I have taken part in collaborative teams for writing the simulation scenarios based on “real-life” patients. Helping to develop the scenarios allowed me the ideal position to guide the students through the nursing experiences that they had during the simulations. I knew what to expect from the specific scenario, and I guided the students to use CT in their clinical reasoning to achieve success. Students looked to me as their faculty of record (FOR) to provide practical guidance based on my years of clinical experience and my knowledge of nursing principles that were useful for practice.

In the study, my role was that of researcher by being an active participant as one of the faculty members in the NUR 323 course and in the simulation laboratory. I served as a clinical instructor for a group of 10 students and I decided how to integrate nursing process and scientific evidence into patient care to allow the students to have a complete experience that helped students learn to become a professional nurse and exercise sound clinical skills.

In this research study, my role was that of content developer for the surveys and instructor's guidelines as well as a clinical instructor (i.e., trainer, support provider), observer, and data collector. For two years prior to the study, I had worked to develop the surveys and modify the reflective journal requirements as additional materials to support instruction.

As a researcher, I collected data for the study. I instructed other course faculty members and the course coordinator about teaching the inference subskills, as well as the debriefing sessions, surveys, and journals to be completed. I conducted the intervention on subskills related to inferences in CT for my own sections. I observed my own group sessions, observed recorded versions of other groups' debriefing sessions; supervised administration of surveys to students, conducted focused student interviews, and kept ongoing journal and field notes about intervention implementation throughout the study.

### **Intervention**

Within the NUR 323 course student nurses learned to apply principles of nursing process, which we taught using simulation, skill acquisition, care planning, and clinical experience in local hospitals. Nursing process has been instituted in the first semester, the previous semester, of the program. Students were introduced to this method of clinical

reasoning as part of their foundational curriculum. In the NUR 323 course, students' prior knowledge was integrated with advanced information about how the process was implemented in nursing care of adults who have acute alterations of health. Evidence from the patient was incorporated into the process, which informed the clinical reasoning that supported problem solving through the nursing process method to achieve positive outcomes for the patient.

The intervention incorporated into the lessons of nursing process application involved the teaching of critical thinking, specifically the teaching of inference subskills during the clinical simulations. The inference subskills taught were (a) querying evidence, (b) conjecturing alternatives, and (c) drawing conclusions. These three subskills were explicitly taught during the Week 1 simulation lab. PowerPoint slides were used to provide the initial presentation of the subskills. Examples of the process for using the three skills were provided and students practiced each of the subskills using several situations.

The three subskills were employed during the Week 1 simulation (Regina Fields simulation). Then during Weeks 2-5 the three inference subskills were reviewed and used in the simulations in which students were participating. By embedding the use of these inference subskills across time, it was anticipated students would be more likely to assimilate these into their thinking and clinical reasoning processes.

During each week a reflective journal was produced by students as they considered their clinical experiences. During Week 1 the students were asked to produce a reflective journal entry focused on the critical thinking process and inferences they utilized during the simulation and how they used the three subskills of inference that were

taught. Then in Weeks 4 and 5 (Marilee Sweetwater simulation), the students were again asked to produce a reflective journal focusing on their use of the inference subskills they learned in Week 1. They were asked to consider their thinking on how they used the three inference subskills during the simulation.

During the first week back to school for faculty in August 2016, I taught faculty how to conduct this intervention in detail. I presented the three inference subskills (querying evidence, conjecturing alternatives, and drawing conclusions), using the same PowerPoint materials they used in their classes that taught the inference subskills. I also provided examples, and we engaged in practicing the three subskills with the use of the same situations they used during class in Week 1. A script was provided to each faculty member to use during Week 1 in order to achieve standardized presentations and avoid misunderstanding or confusion among the students. I provided added instruction to each faculty as needed or requested throughout the semester. They also used and reinforced the three inference subskills during Weeks 2 through 5.

## **Instruments**

For this research project, I gathered quantitative and qualitative data using a variety of instruments. Quantitative data was collected using a survey instrument. Qualitative data came from student journals, student interviews, and a researcher journal.

### **Quantitative Instrument**

The survey consisted of 15 items that assessed students' perceptions about how well they used CT skills. Three of the items assessed CT in a general way. An example of an item for general CT stated, "Critical thinking is essential for effective patient care." Three other items were used to assess clinical reasoning. An example that illustrated

clinical reasoning stated, “I use critical thinking to support my clinical decision making.” Additionally, nine items were used to assess students’ perceptions of how well they performed the three inference subskills with three items tapping each subskill. An example of an item that assessed querying evidence stated, “I carefully assess the evidence about a patient before I make a decision about care.” An illustrative item that assessed conjecturing alternatives stated, “I ‘brain storm’ options as I consider care decisions for a patient.” Finally, an example of a drawing conclusions item stated, “When I make a care decision, I draw logical conclusions based on evidence.” The complete set of survey items is provided in Appendix B.

To ensure the content validity, DeVellis’ (2003) procedure of asking experts to review the items was employed. A group of four experts who were knowledgeable about critical thinking reviewed the survey instrument. They were asked to review the appropriateness of the items and make revisions in wording they deemed necessary. The experts agreed the items were appropriate and some minor revisions in wording of the items were made.

Students rated their perceptions of agreement with the item using a six-point Likert scale where 6 = *Strongly Agree*, 5 = *Agree*, 4 = *Slightly Agree*, 3 = *Slightly Disagree*, 2 = *Disagree*, and 1 = *Strongly Disagree*. Those students who chose to participate in the project completed a pre-intervention assessment prior to participating in the intervention and a post-intervention assessment after participating in the intervention for four to five weeks.

## **Qualitative Instruments**

Instruments used to collect qualitative data included student journals, student interviews, and a researcher journal. Students maintained a reflective journal as part of the project. During each week a reflective journal entry was produced by students as they considered their clinical experiences. During Week 1, the students were asked to produce a reflective journal focused on the critical thinking process they utilized in simulation and how they used the three subskills of inference that were taught. During Weeks 2 and 3 the students used this reflective assignment to focus on their clinical experience in the hospital. Then in Weeks 4 and 5 (Marilee Sweetwater), the students were again asked to produce a reflective journal focusing on their use of the inference subskills like they had used in Week 1. They were asked to consider their thinking about how they used the three inference subskills during the simulation.

As they conducted their reflections, students were instructed to complete their reflective journals based on Tanner's process of "thinking like a nurse" (Tanner, 2006). This reflective journal consisted of the tenets of noticing, interpreting, and reflecting on action and reflection in action that provided opportunities for deeper internal thoughts about simulation and its effect on the students' clinical reasoning and CT. Journal entries were submitted online to NUR 323 Blackboard linked repository. The complete instructions are provided in Appendix B.

Selected students were interviewed at the conclusion of their clinical experiences using a semi-structured interview, which allowed for probing and following respondents' answers. Students were asked to respond to items about CT and its relation to clinical reasoning processes and specific items that examined their understanding of the three



inference subskills that were taught in the simulation labs. Examples of interview questions inquired, “Please describe what you think of when you hear the words, ‘critical thinking,’” and “Describe for me what your experience in simulation has been like for you.” The complete set of interview questions is provided in Appendix C. The student interviews were recorded using a voice-recording device and then transcribed for subsequent analysis.

Because I was the researcher for this study, I was also the practitioner leading the innovation’s implementation in the college. Accordingly, I constantly gathered data about the intervention through my interactions with study participants and involvement with situations pertaining to simulation and critical thinking/clinical reasoning. Thus, throughout the study, I kept a journal of my observations and thoughts related to the intervention and students reactions to it; I recorded journal entries as the context demanded (i.e., as things happened). At times, some situations called for multiple journal entries within a single week; whereas at other times, entries were more limited. This just-in-time method made it easier to record those details accurately as the situations arose.

### **Procedure and Timetable for Implementation**

Prior to the first week of the semester of this study, I trained course instructors on the procedures for administering the surveys, conducting the intervention for teaching the three inference subskills, and implementing the reflective journals. I offered the same instruction to my own clinical groups, and provided ongoing support through face-to-face meetings, phone conversations, and email communication.

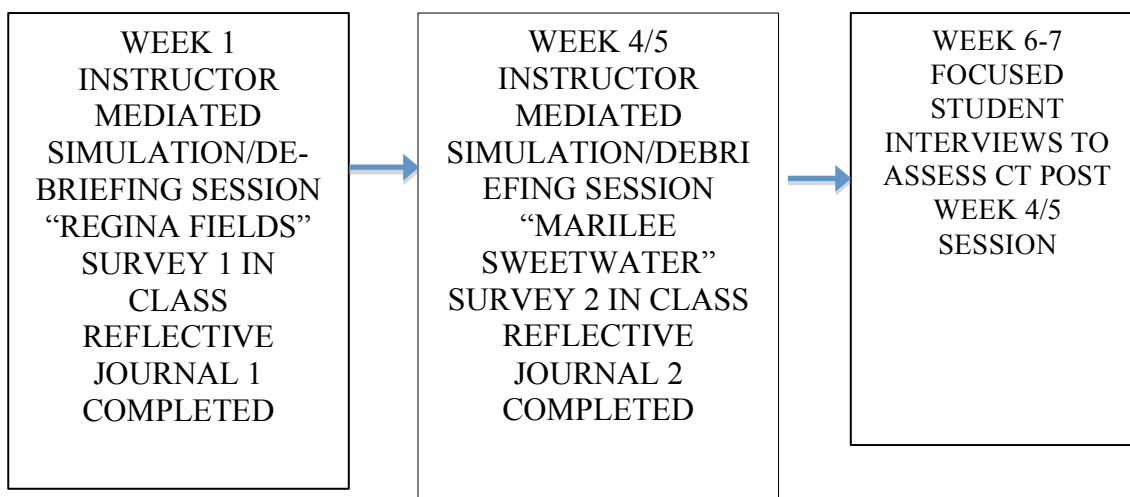
All of the preparation for the intervention and data collection procedures took place prior to the beginning of the fall semester. I met with each instructor who was

assigned to teach one of the sections of NUR 323 in which the three inference subskills would be taught and invited them to the implementation training. The training took place during “First Week Back” that occurred in August just before the start of the new academic year. In July, approximately three weeks prior to the first day of the semester, I began recording my just-in-time journal entries. I distributed guidelines to all of the instructors, including those who did not attend the training, and created a resource folder in the NUR 323 course Blackboard shell under Faculty Resources section. Additionally, I contacted the instructors to schedule the introductory lessons in each of the 12 course sections. Fall 2016 classes began on August 18, 2016.

In the few weeks preceding the semester, I invited instructors to participate in the study. All instructors were invited to participate and sign letters of consent to participate. Throughout September, October, and the beginning of November, course instructors employed the intervention, conducted the simulation, and facilitated debriefing sessions. They administered the two CT surveys as noted on the timeline before Week 1 and after Week 4 or 5 for each of the prescribed simulation sessions. They collected and graded reflective journals for the same simulation sessions for each week in the course as part of the course assignments. The students uploaded their reflective journals to a Blackboard course dropbox as part of their normal assignment load. Throughout the semester, instructors were encouraged to call upon me to support the simulation/debriefing that they may have required.

The CT surveys took place at the beginning and the end of each rotation with Session A in the middle of August and early October and Session B in early October and at the end of November. Strategically, they were scheduled one week after each class

completed the second simulation/debriefing session. Interviews of selected students were conducted at the end of the sessions. Reflective journals were also gathered at the conclusion of each session. Figure 3 illustrates the timeline of the study.



*Figure 3.* Timeline for the study

Each rotation in both session A and session B of the fall 2016 semester completed the simulation/debriefing sessions as well as the surveys, journal, and brief interviews. The simulation/debriefing process was conducted during Week 2 and again during Week 4 or 5 depending on when they were scheduled for the specific simulations involving the patient-named cases (Regina Fields or Marilee Sweetwater). These cases were standardized interactive cases that involved the entire group of students and their instructor. These sessions provided the clinical data these students needed when formulating their clinical decisions based on their own CT. A full list of the journal prompts are provided in Appendix B.

### **Data Analyses**

Quantitative data included a set of pre- and post-intervention surveys, which were analyzed for students who completed the critical thinking perception surveys on both

occasions. Prior to conducting the repeated measures analysis of variance to assess changes in the five critical thinking variables, reliability analyses of the subscales were conducted. Details about the quantitative data analyses are presented in Chapter 4.

Qualitative data included student reflective journal entries concentrating on their CT process during the simulation experience. In addition, student interviews and researcher-generated journal entries that were part of the qualitative data were completed as the study progressed. The qualitative data were entered into HyperRESEARCH (HyperResearch 3.5.2, 2014) and analyzed using the constant comparative method (Strauss & Corbin, 1998). Details about the approach and other aspects of the qualitative data analyses and results are presented in Chapter 4.

## CHAPTER 4

### DATA ANALYSIS AND RESULTS

Results from the study are presented in two sections. The first section contains results from quantitative data. The second section consists of results for qualitative data. For the qualitative data assertions are presented and reinforced with themes, theme-related components, and quotes from participants. In addition to the results, the initial portion of this chapter includes a section that reviewed data collection processes and analyses procedures.

Quantitative data included a set of pre-and post-intervention scores for 22 students who completed the Critical Thinking (CT) Survey on both occasions. These data were used in the repeated measures analysis of variance to assess changes in the dependent variables. Recall the CT surveys assessed five constructs associated with critical thinking and inference. These constructs were general critical thinking and clinical reasoning as well as clinical decision making and the three inference subskills: (a) querying evidence, (b) conjecturing alternatives, and (c) drawing valid conclusions.

To initiate analyses of the quantitative data, reliabilities of the constructs on the survey were examined. Following reliability analyses, a multivariate repeated measures analysis of variance (MANOVA) on the pre- and post-intervention data was conducted to determine whether there were changes in the scores.

Qualitative data included journals of students in both Session A and Session B of the fall 2016 junior semester. A randomly selected group of 32% of successfully completed journals—8/25 for Session A, 10/31 for Session B—was selected for analysis. In addition, 13 interviews were conducted at the end of the clinical rotations. These

qualitative data were entered into HyperRESEARCH (Hyper Research 3.7.3, 2016) and analyzed using the constant comparative method (Strauss & Corbin 1998). In this procedure, qualitative data were coded using initial open codes. Afterward, these initial codes were grouped into larger categories. The categories were then collected into theme-related components, which were then brought together into themes. The themes led to the development of assertions, which were supported with quotes from the original data.

## **Results**

### **Results from Quantitative Data**

Results from quantitative data are presented in this section. Quantitative data included sets of pre- and post-intervention scores for 22 students who completed two surveys. These scores were used in the repeated measures of analysis of variance to assess change in CT variables.

**Reliabilities.** Reliability analyses were conducted using SPSS to obtain Cronbach's alpha coefficients for each of the subscales of the instrument. The results of those analyses are presented in Table 2. Reliabilities for General CT were low and indicated scores on this construct were not dependable. The scores for Items 1 and 13 demonstrated no variability and therefore reliability for both pre- and post-intervention assessments on this construct were low (see Table 2).

Table 2

*Pre- and Post-test Reliabilities for Five Study Constructs*

Construct	Pre-intervention	Post-intervention
General critical thinking	.22	.28
Querying evidence	.83	.74
Conjecturing alternatives	.76	.86
Drawing valid conclusions	.77	.79
Clinical decision making	.56	.64

Reliabilities for querying evidence, conjecturing alternatives, and drawing valid conclusions were all within the acceptable range because each exceeds .70 which has been used as a criterion level for the minimum acceptable level of reliability. By comparison, the reliabilities for pre- and post- intervention scores for general critical thinking and clinical decision making were all below the acceptable level

**Repeated measures analysis of variance.** Following the reliability analyses, the critical thinking variable was removed from further analyses because the pre- and post-intervention reliabilities were too low to depend on these data. A multivariate repeated measures analysis of variance (MANOVA) was conducted on the four remaining dependent measures to determine whether there were differences in the pre-and post- intervention scores on querying evidence, conjecturing alternatives, drawing conclusions and clinical decision making. The test was not significant, multivariate  $F(4, 81) = 0.98, p < .43$ . Although individual follow-up ANOVAs have not typically been conducted when the overall multivariate test was not significant, it was determined to conduct follow-up tests for this dissertation. Thus individual follow-up,

repeated measures ANOVAs were conducted for each of the dependent variables. Pre- and post-intervention means and standard deviations are presented in Table 3 and show scores increased or decreased by no more than 0.1 point.

Table 3

*Pre- and Post-test Means and Standard Deviations for Knowledge, Use, and Self-efficacy Scores*

Construct	Pre-intervention scores	Post-intervention scores
Querying evidence	5.17 (0.70)	5.21 (0.60)
Conjecturing alternatives	4.85 (0.69)	4.80 (0.82)
Drawing valid conclusions	4.94 (0.67)	5.02 (0.75)
Clinical decision making	5.06 (0.56)	5.16 (0.60)

*Note.* Standard deviations are in parentheses

The effect for the querying evidence measures was not significant  $F(1, 84) = 0.21, p < .65$ . Similarly, the effect for conjecturing alternatives was not significant,  $F(1, 84) = 0.39, p < .54$ . The effect for drawing conjecturing conclusions was not significant,  $F(1, 84) = 0.95, p < .34$ . Finally the effect for clinical decision making was not significant,  $F(1, 84) = 2.04, p < .16$ . As shown in Table 3, changes in the pre- to post-intervention scores were very small and indicated the intervention did not affect students' performance on these variables.

### **Results from Qualitative Data**

Results for the qualitative data have been presented in this section. In the first part of this section, details of the analysis processes are described; whereas, information about the outcomes from the qualitative data are presented in the second section.



The qualitative data were entered into HyperRESEARCH (HyperResearch 3.5.2, 2016) and analyzed by beginning with the constant comparative method (Strauss & Corbin 1998). In the constant comparative method, each new portion of content was examined and ‘compared’ to previous codes (i.e., constant comparative approach) to determine whether a code already existed that labeled the new portion of content. If there was a code, which was appropriate, it was applied to the new content; if there was none, a new code was developed. Thus, the qualitative data were coded using initial open codes, which included key words and short phrases. As the coding process moved forward, I developed analytic memos. Some of these memos aided in later work such as developing categories, theme-related components, etc. I continued with analytic memo writing throughout the whole qualitative data analysis process. After the coding part of the process was completed, I gathered the codes into larger categories. Then, I collected the categories into theme-related components, which were then compiled into themes. Finally, I used the themes to develop assertions. To ensure credibility, at each step of the process—developing larger categories, devising theme-related components, formulating themes, etc.—I revisited and reflected on the data, the codes, the categories, etc., to ensure data supported the higher level interpretations I developed. As a result, I performed data analyses in a careful, analytical way. The processes were credible because I used thoughtful, reflective, and detailed processes (Guba, 1981).

Table 4 is provided to offer an overview of the qualitative results. As noted, the table included information about theme-related components, themes, and assertions based on the responses during the interviews and journal entries. In the part of the chapter following Table 4, each of the themes are presented in more detail by using theme-related

components and presenting quotes to substantiate the themes and theme-related components.

Table 4

*Themes, Theme-related Components, and Assertions*

Themes and Theme-related Components	Assertions
<p><i>Learning and Using Inference Skills</i></p> <ol style="list-style-type: none"> <li>1. Students described their use of inference in general ways as applied to nursing activities.</li> <li>2. Students applied specific inference skills during simulation scenarios and clinical practice.</li> </ol>	<ol style="list-style-type: none"> <li>1. Students learned and used general inference abilities as well as applying three inference skills in a limited way during the scenarios.</li> </ol>
<p><i>Clinical Reasoning (Thinking Skills)</i></p> <ol style="list-style-type: none"> <li>1. Students demonstrated understanding/knowledge of clinical reasoning.</li> <li>2. Students used knowledge to make decisions about care.</li> </ol>	<ol style="list-style-type: none"> <li>2. Students demonstrated limited use of clinical reasoning.</li> </ol>
<p><i>Nursing Judgment (Reflection)</i></p> <ol style="list-style-type: none"> <li>1. Students applied reflection to their work following simulation scenarios.</li> </ol>	<ol style="list-style-type: none"> <li>3. Students demonstrated emerging reflection skills related to nursing judgment.</li> </ol>
<p><i>Critical Thinking in Nursing</i></p> <ol style="list-style-type: none"> <li>1. Students suggested instruction fostered their critical thinking.</li> <li>2. Students valued critical thinking in nursing.</li> </ol>	<ol style="list-style-type: none"> <li>4. Students gained a foundation upon which they can draw to use critical thinking in their professional roles.</li> </ol>

*Note.* Themes are in italic font.

**Learning and using inference skills.** Assertion 1 states, *Students learned and used general inference abilities as well as applying three inference skills in a limited way during the scenarios.* The following theme-related components comprise the theme that led to Assertion 1: (a) students described their use of inference in general ways as

applied to nursing activities and (b) students applied specific inference skills during simulation scenarios and clinical practice.

***Students described their use of inference in general ways as applied to nursing activities.*** Post-intervention interviews with students provided insights into their learning about inference skills. Overall, students offered statements that described their use of inference. These statements tended to be general in nature and seemed to reflect their level of education and limited experience in using inference in nursing. Specifically, the students discussed how inference was connected to their perception of nursing practice as evidenced in simulation and clinical settings. These connections were evident in the following quotes.

It's kind of similar to like the scientific method . . . I think. It's like you have to assess a situation and then you have to make a judgment about it or with the hypothesis about it, like what the problem is . . . and after you decide, after you assess and make a hypothesis, then you have to like make a decision on the best course of action to get like the ideal results. (Student A)

Well, inference is basically the nursing process, because you are requiring evidence as your assessment, and then you conduct your alternatives and drawing conclusions as the diagnosis, that's the way I see it. So just like the nursing process or assessing the patient, I will be getting the evidence, and then you know taking those assessment findings, and you know, seeing what could potentially be the problem and finding out and determining what the problem is, that's part of that too. (Student B)

I would say inference is used like a lot, because you're using it with the whole part of the nursing process in assessing your patients, and you have to figure out how things are kind of interrelated in making those inferences about how things connect because not all of it is going to be like right here in front of you. You have to be able to connect the things, and then that's going to lead you to how you're going to make their plan of care. So inferences are really essential in planning your care for your patients, because they help you to figure out kind of what you need to do for them based on the information that you have. (Student E)

Student F formulated this idea about her understanding of inference and its use in nursing, when she claimed,

I guess it's every day. You know like looking at vital signs, looking at symptoms, asking them how they're feeling and then based off all the information make a decision on what you should be doing that day for them.

Student M talked about her understanding of inference when she stated, "Well, inference is basically the nursing process because querying evidence is your assessment and then the conjectural alternatives and drawing the conclusion is the diagnosis, that's the way I see it."

Taken together the responses of students suggested they were rather indiscriminant in their abilities to discuss inference in-depth. Their comments suggested a general, non-descript understanding of inference. Importantly, they made the connection between these skills and the nursing process, which demonstrated they had rudimentary understanding of how inference and its subskills were involved in nursing.

***Students applied specific inference skills during simulation scenarios and clinical practice.*** With respect to using the specific inference skills taught during class, students demonstrated some, albeit limited, facility in their use of querying evidence, conjecturing alternatives, and drawing conclusions as noted in their responses below. As noted in the following responses, students spoke of using these inference skills during simulation scenarios and clinical practice.

Student A described her use of querying evidence in simulation when she said,

Something that I observe in simulation was when we were assessing a patient who I believe was hyperglycemic, she was tachycardic, and everything like that. And we were all trying to figure out why that was, and at the end, like I think we noticed that we needed to assess, like assessing, the nursing process is the first thing you do, and we criticize that, the wrong bad fluids at home, and that was the problem. So she didn't necessarily need insulin or anything like that. So assessing was really important during a simulation.

Student J described using the querying evidence component of inference when she noted,

Querying evidence is everything I think at this point, everything we've been taught up to this point through evidence-based practice in using appropriate care for patients and using what research says and what the patient needs and keeping them at the center of the care. Querying the information really means taking the best applicable information and implementing it and using it for your benefit in the patient care.

Student G explained his use of conjecturing alternatives as part of the simulation experience when he claimed,

When you have collected all your evidence and then you have all your options, that's kind of like when you're planning and trying to decide what to do next. You have to use your knowledge and what you're observing, so you kind of have to put two things together to realize like what's the next step, like what do we do after we have the evidence? You have to use all those parts of what you've observed, but what you also know what's documented in the chart. It's like a million things you have to put all into one pile to decide what's the priority, what's the main next step that we have to make as our—the alternatives would be all your choices, so you basically select the best option.

Student L discussed drawing conclusions in simulation as being based on examining the data when she said,

I think that goes back to looking at multiple results and assessments from the patient. You can't just take one answer and then assume something like you have to look at the different areas like the assessments, so like integumentary, neural all of those together to come with a conclusion.

She continued her explanation of drawing conclusions as she said,

I would say I would draw conclusions valid ones, I think that came from learning a lot during lab. For example, like, the big thing was like what do you do in case of an emergency like hypervolemia or like say you're giving the wrong blood to a patient or something like, do you immediately stop it or do you not? And I think I would. I was able to like appropriately draw conclusions from doing that by taking what I learned in lecture and then applying it and it was really, really important. Like knowing what I was doing before I did it was super. That's how I was able to draw conclusions.

Collectively, the students' skill application for using inference including the recently learned subskills of querying evidence, conjecturing alternatives and drawing conclusions suggested they were rather uncertain about their abilities to use inference comprehensively. Their comments implied a general understanding of inference application. Nevertheless, they made the association between these skills and the nursing process, which demonstrated they had a fundamental understanding of how inference and its subskills were connected to nursing.

**Clinical reasoning (thinking skills).** Assertion 2 states, *Students demonstrated limited use of clinical reasoning.* The following theme-related components comprised the theme that led to Assertion 2: (a) students demonstrated understanding/knowledge of clinical reasoning and (b) students used knowledge to make decisions about care. In the post-intervention interviews students offered statements that described their knowledge of clinical reasoning. They discussed how they applied clinical reasoning to make safe, effective clinical care decisions for their assigned patients in simulation and clinical practice. Additionally they connected clinical reasoning and its application to safety in patient care decisions in their written journals.

***Students demonstrated understanding/knowledge of clinical reasoning.*** Students provided thoughtful evidence of how they understood and used clinical reasoning. They used their knowledge to make evidence-based care decisions for their assigned patients both in simulation and in clinical practice.

Student A described clinical reasoning when she said,

My understanding of clinical reasoning would be when you're in the clinical setting, and it's kind of like a mix of evidence based practice and what you learned on lecture, and you have to make a decision on what would be the best treatment of action during clinical.

Student J stated, “My understanding of clinical reasoning is . . . using logic in the clinical setting to not only influence your patient care, but to influence how you manage yourself in the setting as well.”

Student B described clinical reasoning in the following way when she said,

I think it’s evident that practice plays a large part in it because we need the evidence to do the clinical reasoning. So you have evidence from your patient assessment, and then you have evidence from studies that have been done and you can apply those together and make clinical decisions to your clinical reasoning.

Student D described clinical reasoning as connected to decision making when she claimed,

Feeling the experience that I have that using my decision making skills in a more critical way to figure out and decide the best care for my patient. . . . It can be used in the interventions trying to figure out the best situations to use for you patients to try to get the best outcomes and to use in the outcomes to make sure that the interventions are actually working correctly. And that if you need evaluation in there, so you need all that critical thinking to help you make sure you’re doing the best for your patient.

With respect to clinical reasoning, Student G stated,

Well, clinical reasoning is basically critical thinking, I guess. And it—I mean sometimes you get in there for use and you just got to maybe step back and think like . . . and like really make a good decision based on you know evidence and what you learned.

In her journal, Student I described her use of clinical reasoning when she wrote, “I thought that there was a lot more to this patient’s symptoms than I had previously assessed on my own. I had made basic assumptions, but there was more connections to the pathophysiology than I had known.”

Student 7 reflected on her understanding of clinical reasoning in simulation specifically when she wrote,

While caring for the patient, I had gone in with an idea of what I was supposed to do, but quickly had to critically think on my feet about what I needed to do differently to better fit the changing situation.

Student 14 wrote about simulation and her emerging skills with clinical reasoning when she recorded, “What stood out for me during this experience is how real it actually felt. When being put into a situation with a patient you never know what they are going to say or what problems you may encounter.” These statements in the post-intervention interviews and reflective journals demonstrated the students’ elementary knowledge of clinical reasoning and how these emerging skills were used in clinical practice.

***Students used knowledge to make decisions about care.*** The students considered their attempts to apply this knowledge to make safe and effective patient care decisions. The following quotes show the fundamental level of clinical reasoning that is prevalent in junior level students.

In one part of the simulation scenario students interacted with the simulated patient who was experiencing simulated complications of elevated blood sugar. With respect to making decisions for patient care, Student K stated,

I think we used them a lot in SIM. We were given a lot of situations that were you know you needed to think what’s going wrong. For example, we had the wrong intravenous solution hanging for the diabetic patient. It was like a process where the students who were in that situation they were trying to think of all the possible things that they could do to figure out what was going wrong. And then they finally realized once they checked the bag that’s what it was, but they went through a bunch of alternatives of okay what could be wrong. It’s the blood sugar that’s what’s—their blood sugar is high that’s what’s happening, but what’s causing it.

The students then devised a collaborative decision to change the incorrect intravenous solution to treat the patient’s symptoms, which then positively affected the care of this patient.



Student A illustrated her use of clinical reasoning for patient care decisions when she stated, “When we were assessing patients, I have to do that with each patient like assess them, hypothesized [possible solutions] and then come up with a course of action.”

Student D described using clinical reasoning in patient care decisions when she said,

It’s [clinical reasoning is] used in nursing practice just to treat our patients and know when to make changes and things like that when we need to change the plan, or like get other medical professionals involved and stuff like that.

Student F discussed clinical reasoning application when she maintained: “I think you have to remember what you learned in class and use it in the clinical setting and make a good decision based off of what you learned.”

In terms of clinical reasoning, Student G stated,

When you have collected all your evidence and then you have all your options, that’s kind of like when you’re planning and trying to decide what to do next, you have to use your knowledge and what you’re observing, so you kind of have to put two things together to realize like what’s the next step, like what do we do after we have the evidence. You have to use all those parts of what you’ve observed but what you also know what’s documented in the chart. It’s like a million things you have to put all into one pile to decide what’s the priority?

Students demonstrated clinical reasoning skills they applied to their patient care decisions as indicated by the following quotes gathered from students’ journals.

Student 11 wrote,

Upon walking into the room, there were obvious issues, but not getting overwhelmed and focusing on priorities was the key to being successful in this situation. Her amputated leg being at bed height with her unaffected leg putting pressure on it was the first thing that needed to be addressed, once this was covered then pain medication, patient identification, and other communication could take place.

Student 15 described her clinical reasoning in her patient care decisions when she recorded,

Our patient was on a PCA pump and already had a fear of using narcotics for pain management. When we entered the room the patient was unresponsive to our questions. Her respiratory rate had dropped to 7 and her SPO2 was at 88%. We decided to increase her oxygen to 6 liters/min and then called the physician. On the phone with the physician, it took us a while to realize that we should stop the pump and administer narcan since our patient was most likely experiencing respiratory depression from opioids. Once we administered the narcan, the patient became oriented and her respirations increased. We also did a very brief neurological assessment. We briefly spoke to her daughter who was also in the room and then exited. I thought the situation was something that required more urgent action; however, I felt that we were nervous and did not respond as quickly as we needed to.

These students' statements suggested they were inexperienced in using their skills to determine the nature of the patient issue and apply collected information to make a plan of action that affects patients' health in a positive way. Further, they were novices in determining what actions to pursue, which demonstrated they had a rudimentary understanding of the connection of clinical reasoning to patient care.

**Nursing judgment (reflection).** Assertion 3 states, *Students demonstrated emerging reflection skills related to nursing judgment.* The following theme-related components comprised the theme that led to the Assertion 3: (a) students applied reflection to their work following simulation scenarios. Students reflected on their thoughts about nursing and useful clinical instruction they received. Post-intervention reflective journals were written by students using prompts/questions to elicit thoughtful responses. Post-intervention reflective journals from students provided insights into their nursing judgment development during simulation scenarios. Overall, students offered statements that described their observation and development of their own professional reflection skills. Specifically, in their writing, reflected on their development as professionals and how that was connected to their nursing activities as evidenced in simulation and clinical settings.

***Students applied reflection to their work following simulation***

**scenarios**. In reflecting on the topic of developing skills during simulation scenarios,

Student 3 suggested she still needed to develop her skills when she recorded,

During this situation I did my best to perform a basic physical assessment on my patient to get as much information as possible on her current medical status. After the assessment I looked into R.F.'s diagnosis more thoroughly to get a better understanding of the key things I should have focused more on during her assessment. I could consider practicing this situation again in a lab environment with a fellow student acting as the SIM patient and reinforce what I learned to do.

Student 4 realized what was important to note when making patient care decisions when she scribed,

From this situation, I learned that plenty more [*sic*] information was needed to obtain a complete picture of the patient. In the future, I want to obtain data on her intakes, her pain, and whether she is breathing comfortably. I will also give patient teaching about taking caution when walking, proper fluid intake, and calling for help when she wants to get up.

Student 5 thought that simulation was needed to promote her skills for her future professional role especially when dealing with patient complications or adverse reactions as noted when she wrote,

It was necessary for us to do this simulation so that in the future we are able to pick up on patient cues, and use that in our assessment to guide our care for the patient. When I was in the simulation I just tried to take a second to think about what to do next. In my mind I was going over her condition and thinking to myself about what assessments may be useful. I continued to practice the Foley catheter insertion. Simulation obviously isn't as realistic as it is in the clinical setting, but I had to make sure I at least had the process, steps, and understanding of the procedure.

Later in the rotation at about Week 4, Student 5 wrote about her thoughts during a more complicated simulation involving a medication error with a diabetic patient scenario when she wrote,

The client did not seem to notice that the wrong solution was hanging, or that there had been a medication error in the amount of insulin given, so there was no

reaction there. In terms of the other student nurse I was working with, she also felt awful that we didn't realize the wrong medication was hanging right away and that we gave the wrong amount of insulin. We talked about how we may have read the orders wrong. Next we just talked about it among the other students in the briefing room. We discussed how the previous nurse may have ended up grabbing the wrong bag, as well as the importance of using the five rights to make sure you have the right agent to give the patient. I learned to check, double check, and triple check that you are giving the right thing to the patient. Whether its IV fluids or another medication, it is crucial to do your five rights to avoid more serious complications.

This reflection demonstrates the student's growth in her nursing judgment process despite the error which could happen in a real clinical setting. This student learned a valuable lesson that she will carry with her into her professional career which may just save patients' lives.

Student 7 reflected on what she learned and how this affected her growth as a future professional when she wrote,

I feel as though this situation showed me that I am more prepared than I believed myself to be. While watching others, I thought quickly about methods that could be implemented to help the patient (whether they were implemented or not) while also noting things that I did not catch onto, but made sense (such as always assessing everything in the room to make sense of things, such as running fluids). I took the happenings, analyzed them, and made the conclusion that slowing down for a second is a bit helpful in analyzing and fixing a problem. So after watching others, I did this during my scenario, which then led to me being able to point out how my patient had an allergy to a prescribed medication, avoiding an allergic reaction and dangerous situation for my patient. The outcome of this situation for me was the assuring myself of the importance of double-checking things and carefully assessing situations.

These written accounts indicated reflection was useful in helping students to recognize their need for continued learning and development as a professional. Further, these accounts suggested reflection was an emerging skill among these nursing students.

**Critical thinking (CT) in nursing.** Assertion 4 states, *Students gained a foundation upon which they can draw to use critical thinking in their professional roles.*

The following theme-related components comprised the theme that led to Assertion 4: (a) students suggested instruction fostered their critical thinking and (b) students valued critical thinking in nursing. Students discussed how they used CT skills in the simulation scenarios. Post-intervention interviews with students and reflective journals from students provided insights into their critical thinking. Generally, students offered statements that described their use of critical thinking. Specifically, the students discussed how CT was connected to their experience of nursing practice as evidenced in simulation and clinical settings. Further, in their responses and journals, students suggested instruction fostered their critical thinking and they valued critical thinking in nursing.

***Students suggested instruction fostered their critical thinking.***

Student 1 described how instruction was helpful in developing her CT when she wrote, “I appreciate how our faculty discusses concepts and helps us understand the real-life scenarios that we will encounter in our future careers. I would like to continue having group discussions.”

Student 3 recognized the value of the simulation experience to her professional development when she recorded,

I think this was the first moment I realized how significant critical thinking is in the clinical nursing environment. In this case we had to consider R.F.’s diagnoses, understand complications associated with that diagnosis, and be able to recognize signs and symptoms of any complications. I would be sure to pay better attention to the assessments relevant to complications of the patient’s diagnosis. I feel that after understanding that R.F. was experiencing FVE after the experience I was able to look back and understand the key things to look for.

Student 5 described the instruction of the simulation experience as a valuable learning experience when she scribed,

I learned that symptoms are there for a reason and can indicate whether your patient is getting better or worse, helping guide your patient care. We were able to

understand that the patient was having signs and symptoms of hyperglycemia even before we took her blood sugar. At that moment I feel like the knowledge we had learned in class and prior to the simulation really came together with our nursing skills to make a decision on what was the next priority.

Moreover, Student 6 reflected on the effect that instruction has on critical thinking for herself and her peers when she wrote,

I learned that it is okay to make mistakes during simulation because everyone learns from it and we will all remember it even after we graduate. The important thing is to understand why the mistake happened and how to prevent it from happening in the future. What went well about this situation is that everyone seemed to learn from it in this situation.

Student A reported how the instruction was valuable to her thinking process when she stated,

It's helped me to know that I need to hang onto the assessing, hypothesizing and evaluating, like what every patient situation, whether it be like socially interacting or like you know, implementing practice for their diagnosis, I think it's helped me to like slow down but like do it quickly, so I can slow down and assess them but do it in a timely manner like efficiently. So yeah, for that process it is helpful.

Student 9 discussed how CT is fostered in simulation when she stated,

During our conversation, the patient was telling us about how she was going to go to Vegas with a friend soon, and afterwards the SIM nurse explained that she was trying to get us to tell her that she would need to limit her walking in Vegas, which was an Ah Hah! Moment as neither of us put that together with the situation and the conversation that she would need to limit her activity.

This allowed the students to reflect on the experience and use the information learned to improve their decision-making process for future care situations. The previous statements outline the importance of having students practice skills and utilize their critical thinking. Students indicated their initial anxieties were somewhat relieved during the exercises. Such opportunities for developing increasing competence builds confidence that they can accomplish these efforts in a more cohesive manner as they progress through the nursing program and into professional roles.

***Students valued critical thinking in nursing.*** Overall students described learning in simulation to have value by keeping the environment psychologically safe, so that students practiced skills and gained confidence in their ability to make safe practice care decisions for their patients.

Student J noted this concept of value when she said,

I think it's helped to develop my clinical reasoning skills exponentially over the semester. It was nice to go in feeling good about yourself with what you had in your tool-box, but we didn't really know how to apply it. And inference really is the application of it and a learning inference and inferring things from the situation in the patient and the charts and your experiences is the application and that's the part that made me feel like a nurse this semester, whereas leading up to this, it was all nursing things [knowledge] It really makes you apply what you know and that's the feeling of being a nurse and that kind is what happened over this semester, it went from feeling like I was learning nursing to feeling like I can be a nurse, I'm a nurse.

Student K described the value of learning CT on her nursing skills development when she suggested,

I think it helped a lot when you're sitting down writing your care plans after because as a student it's lot of times it hard to have to be practicing your skills, and going through the nursing process in your head because you're trying to focus on so many different aspects of the students. But when you go home and you sit then you're writing the care plan and you—you're using all those processes like how did, and what did I do when I was assessing? Did I consider different alternatives with the patient? These, with the nursing diagnosis, I came up with it helps, you also, to you know, rank them to determine which is more important. You know when you're assessing what's the biggest patient's priority. And you're using all that evidence that you gathered in clinical with your patient and then using that to come to your conclusions.

Student 7 highlighted the value of critical thinking during her simulation experience in her journal when she recorded,

I thought that situation was stressful and scary, but realistic in a hospital and care setting. I believe things such as med errors and hyperglycemia happen all of the time and that we as nurses need to be knowledgeable about actions that can save our patients and take them out of distress. . . . I feel as though this situation showed me that I am more prepared than I [originally] believed myself to be.

Student 8 described the value of the simulation for her developing CT capabilities which prepared her to be cautious as a professional nurse when she wrote,

I learned how important it is to assess not only the patient, but also the environment. . . . I felt proud that I recognized the signs of hyperglycemia so quickly, especially since I have never actually seen someone who is hyperglycemic. In the future, I will assess my patient and, unless immediately life-threatening, investigate to discover what caused the problem.

In discussing the value of critical thinking in nursing observed in clinical practice, Student H stated,

We believe our inference that it was this, so then we decided to write this type of care. It allows you to just go through that whole process from start to finish so that you're constantly getting that process into your head, and you're then able—it makes it become second nature. So I appreciated that, because especially in simulation, because you were broken up to different pieces, so being able to go through it completely as a group helped make all of those connections. . . . Just being able to draw on that information that you do know and being able to assess your patient and then using that knowledge with what data you've gathered to then make your inference. I mean it directly affects your care, because you then use the knowledge you've gained and the data you've gained from assessing the patient to be able to determine, "Well, this is what's happening with the patient, and this is how I'm going to care for them."

These observations and experiences as highlighted in the previous statements provided a view from novice nursing students' perspectives on growth and development of their CT and clinical judgment as it pertained to patient care decisions. In all cases, the students seemed to place a value on this simulation experience to make them better professional nurses who were equipped to handle the complex patient care situations nurses face routinely in clinical practice.

Taken together, the qualitative data showed students were developing their skills in CT including making inferences, which support the clinical reasoning abilities that nursing students must acquire to grow as professionals. Importantly, these skills appeared



to be emerging among this group of novices. Additionally, students were developing emerging reflection skills. The explanation of these findings are presented in Chapter 5.

## CHAPTER 5

### DISCUSSION

Initially, the problem driving this action research project is the fact that Junior nursing students are expected to develop clinical reasoning skills including critical thinking and inference skills to support their development as nursing professionals. Further, they are asked to apply these skills to achieve positive health outcomes for their assigned patients. As part of their preparation, students are exposed to critical thinking within the nursing process, which is a method of clinical reasoning and patient care decision-making. Integral to the instruction of this process is the experience of simulated patient care for all students. Students are brought into the simulation lab in small groups with their clinical instructors to experience standardized simulation scenarios in which they must make clinical decisions for patient care based on their knowledge of the case as well as their ability to think critically and logically about interventions that might be performed to promote positive health outcomes. In the semester during the study, students participated in an instructional component that includes information related to inference and the application of three subskills within this category.

In my position as a clinical instructor for nursing students in the junior level of the baccalaureate nursing program, I conducted the study to examine how and to what extent the students are engaging in CT and using inference skills during their simulation scenarios and clinical nursing practices in local agencies. I also examined reflection skills in the study.

## **Summary of the Findings**

Quantitative results are very minimal. The results show quantitative scores for clinical reasoning and three inference subskills increased by no more than 0.1 points. Given the limited outcomes for quantitative variables, discussion of quantitative data is conducted as part of the study's limitations.

Qualitative findings are a bit stronger. Overall, there are four findings. First, in the interview data, students demonstrated some foundations for CT. This foundational knowledge of CT provided a base on which other nursing CT skills like clinical reasoning, inference, etc. may be built. Second, students described their use of general inference skill and three inference subskills in very modest ways. Their description was limited and not particularly precise. Third, students described their use of clinical reasoning (CR) in uncertain ways. Again, their descriptions tended to be limited and imprecise. Fourth, students demonstrated emerging abilities as they used reflection to improve their practice. Notice that the first three findings provided information that is responsive to Research Question 1, "How and to what extent did implementation of teaching the inference critical thinking subskills influence students' acquisition and application of CT skills and clinical reasoning?" By comparison, the fourth finding provided information appropriate to answer Research Question 2, "How and to what extent did the implementation of self-reflection about CT skills during simulation activities influence students' acquisition and application of CT skills?"

These four qualitative findings are explained in the section that follows. Connections to related literature and theoretical perspectives are integrated into each of these sections to aid in the explanation of the findings, as appropriate,.

## **Discussion of Qualitative Findings**

**Finding 1.** In the interview data, students demonstrated some foundations for CT. Students valued CT and suggested instruction is useful in helping them to develop CT. Thus, students perceived the instruction they received as facilitating their efforts in applying CT to the simulation or other clinical experiences. Such learning-by-doing is characteristic of many professions. In particular, given the context of the simulations, CT is a natural response to the demands of the situation.

In their descriptions, students used a general approach to describing CT as they applied it to simulations and other clinical experiences. These findings are consistent with the overall notion that CT is a part of the CR and the nursing process (Facione, 1990, 2015; Facione & Facione, 2008; Tanner, 2006). In particular, Facione and Facione claimed CT was an integral part of clinical reasoning (CR) that involves a complex set of thinking skills that students must develop before entering professional practice. Further, these authors go on to say CT during the nursing process involves a component in which nurses use CR to make clinical care decisions based on patients' responses to their illnesses. Finally, Tanner suggested CR is influenced by what the nurse brings to the situation. Thus, in the current context, students who brought general CT skills to the simulation applied those general CT skills.

**Finding 2.** Students described their application of general inference skills and three inference subskills in very modest ways. Their descriptions were limited and not particularly precise. Such outcomes can result when students are engaged in initial learning of any kind. Command of the learning, that is, a certain degree/level of learning, must be attained before performance of the learning is executed. Thus, use of the three

inference subskills, such as querying evidence, conjecturing alternatives, and drawing conclusions must be highly practiced to become automatic and routine among nursing students. In fact, it appears the use of these skills, like other nursing skills, follows a developmental trajectory, which requires a great deal of practice before expertise is attained. Such a developmental outcome is consistent with Benner's (1984) stages of clinical competence. In particular, students in this study were novices who had no real experiences in the nursing setting and who required large amounts of support and cues (Benner, 1984).

**Finding 3.** Students described their use of clinical reasoning (CR) in limited ways. Again, their descriptions tended to be restricted and imprecise. Similar to the previous finding, this outcome depended on experience and practice. At this stage of development, the nursing students in this study had little experience or practice in using CR because they were just beginning to learn CR as it is applied to the nursing process. Again, the use of CR, like other nursing skills, is developmental in nature and requires substantial practice to increase the skill to appropriate levels of performance. Thus, like the previous finding, students are novices who are only beginning to learn CR (Benner, 1984).

**Finding 4.** Students demonstrated emerging abilities as they used reflection to improve their practice. In a professional program such as nursing, students learn a great deal as they participate in professional practices and then as they reflect on that practice. Participation in CR during simulations is required along with subsequent reflections as a part of the NUR 323 curriculum. In the reflections, students recorded their thoughts about

the simulation—what went well, what did not, what they would do to improve their practice the next time, etc. in journals for the course.

The emerging reflection abilities are consistent with work by Schön (1983) who recommended reflection played a powerful role in influencing professional practice. Schön stated that improvements in practice-based disciplines like nursing occur when professionals re-examine their efforts as they attempt to improve their practice. Similarly, Tanner (2006) suggested reflection on practice aids nursing professionals to further develop their clinical skills.

### **Limitations**

As with any study, there are factors that may influence outcomes in the present study that are not directly related to the intervention. The first limitation is time. The brief length of time this study took place may have an adverse influence on the outcomes. For example, recall that the scores on the CT, inference subskills, and CR increased by no more than 0.1 point for any of those measures, which indicates the intervention has no effect on these variables. During the fall 2016 semester the study occurred over two 7.5 week courses. This timeframe only allowed for about five weeks of intervention due to course structure constraints. Thus, the time interval may be too brief to allow for a greater effect on the scores for these measures. Such a brief time frame may also contribute to the limited development of these CT skills and the imprecise ways students discuss these skills in their interviews.

In a related manner, the intervention, that is, the teaching of the inference subskills, may not have been sufficiently powerful because it was integrated into instruction along with a large amount of other content. Thus, insufficient time may have

been devoted to teaching these skills. This matter is closely related to the issue of fidelity of implementation or the degree to which the instruction in all the sections of NUR 323 matches the instruction that was originally designed for the inference subskills and the extent to which instructors required students to engage in clinical reasoning during the simulations.

Additionally, the Hawthorne effect (Smith & Glass, 1987) is a potential limitation in this study. I was both a researcher and data gatherer for this study. As a researcher I was in regular communication with student participants and facilitated individual interviews. The extra attention participating students received may have influenced their thinking about CT and application of inference subskills and their responses to the interview items.

Finally, in the analysis and interpretation of qualitative data, bias is always a potential limitation. Being an insider who has intimate and tacit knowledge of the setting can lead to bias, if that knowledge is not interrogated. To minimize bias, I carefully considered the codes and theme-related components at each step to ensure the data supported the higher level interpretations I developed. Further, I revisited and reflected on the data at each step to ensure a careful, analytical analysis. Thus, I tried to eliminate bias to the greatest extent possible, but my interpretations are still my interpretations and they may not be what another person may derive from the data.

### **Implications for Teaching**

Using critical thinking and inference skills in nursing education makes sense in today's curriculum. Nevertheless, students' lack of previous exposure to critical thinking concepts presents a major barrier to implementation within the nursing curriculum. Prior

to embarking on their work in NUR 323, nursing students were not well versed in making clinical decisions based on logical thought processes. This conclusion is evident in students' responses during the interviews. Thus, the continuing use of instruction in CT, inference skills, and CR is clearly warranted.

The interview findings from this study reveal several modest, but positive outcomes resulting from learning and applying CT and inference skills. Based on these outcomes, I plan to continue to develop CT and inference subskills exercises for use in simulation and clinical settings with nursing students. Moreover, in the future, I plan to find additional ways to advocate for the teaching of CT and inference skills during simulation learning situations for our nurses in training.

Additionally I believe this study had implications for education practice as nursing programs begin to utilize concept-based curricula. Our own Undergraduate Program in the College of Nursing and Health Innovation at Arizona State University is in the midst of major curricular changes to use concept-based curriculum. Although this presents challenges for change in this journey, I believe critical thinking and application of inference in healthcare will promote the further use of evidence-based practice that today has become the norm of nursing and medical practice. Further, it appears that Facione (2015) and Tanner's (2006) models of critical thinking and thinking like a nurse can be merged and integrated into concept-based curricula to improve the professional nurse graduate of the future.

In addition, I believe development of video modules for courses on the use and application of critical thinking and inference subskills for nursing and healthcare may be useful to integrate critical thinking more consistently and comprehensively into positive



patient care outcomes. For example, those video modules could be used effectively in a *flipped* classroom format where students view the videos prior to class and then are *guided* to apply their learning in classroom health care simulations like those in NUR 323.

### **Implications for Research**

Results from this study suggested two main areas of future research. The first area pertains to measuring change in students who use and apply CT and inference subskill principles in their clinical care decisions. At the onset of this study, my focus was on the students' internal thinking process and measuring changes in their decision-making capabilities in simulation scenarios and clinical settings. The qualitative data from the interviews and reflective journals showed students were not as articulate as expected in expressing their understanding and application of critical thinking and inference concepts. In future research, I would examine these outcomes more closely to devise a developmental trajectory that might be useful to understand this phenomenon and to develop teaching strategies to assist students in learning to use these skills as part of the clinical reasoning process. Additionally, I would also explore instructors' methods for teaching CT, inference subskills, and CR to discover how CT and CR might be taught more effectively in nursing education and clinical healthcare.

### **Personal Lessons Learned**

I have been a practitioner in clinical nursing for over 40 years, and I have been in a position of leadership in a variety of roles in nursing education concurrently for 13 years. Prior to my experience conducting research, my perception of scholarly research was limited. For instance, I previously held beliefs that research was typically conducted

by individuals within clinical practice. I relied on research from others to provide evidence for my own clinical practice. I have learned that I too can produce evidence to support new practice in both clinical and educational arenas as a seasoned nursing professional and novice researcher. This has bolstered my own confidence as a nurse educator and researcher.

Through the experience of identifying a problem of practice, exploring the scholarly literature and theoretical frameworks, planning, implementing, and evaluating an intervention, I learned how to consume, build on, and originate research in a thoughtful manner. I am better prepared to use the research I deem valuable to conduct inquiry or gain perspective on a practice problem because I am confident in my abilities to critically evaluate published work, including methodologies, data analyses, and findings, which may be appropriate to my own research work or teaching practices.

I also learned that skills and processes employed in effective research were particularly valuable for practitioners and educational leaders working as change agents. For instance, quantitative and qualitative data have been used to validate each other by building on each other to provide a clearer understanding of results by amplifying explanations. As a nurse leader-practitioner, I learned that research approaches can complement one another to achieve information about professional educational development in nursing education and healthcare. This can be achieved by collecting data through multiple sources such as surveys, interviews, and focused discussions with participants. Further, this line of inquiry can produce compelling results to shed further light on learning of CT skills and students' applications of these concepts to improve clinical care decisions.

In sum, the most valuable lessons of the research process have resulted in further development of my personal belief system about what it means to be a scholarly and influential nurse educator. I have also learned to value research and use it to guide my own professional clinical and educational practice and influence future generations of professional nurses.

## **Conclusion**

By viewing nursing education through the lens of critical thinking and simulation, 2017 is an exciting time to be a nursing educator. Nursing schools are converting to concept-based curriculum at a rate that is faster than ever. It appears that a new generation of nurses and healthcare professionals are embracing the ideas of concept-based education to improve the *overloaded* content that is currently being imparted to our students. I began my teaching career over a decade ago and have been passionate about students becoming better decision makers for their patients. This is particularly imperative because nursing professionals see so many patients who are sicker than previously and who need more advanced complex care. Providing students with the skills to solve complex healthcare problems for their patients has become a passion for me. Providing students with the tools they need so they can formulate safe effective interventions is integral to improving the healthcare system for their patients.

In my current position at CONHI at ASU, I have the opportunity to share what I know about critical thinking and inference application with my students and colleagues as we embark on an exciting future in concept-based teaching. I do this by being both an informal and formal leader in whatever courses I happen to be teaching. That being said, I feel strongly about teaching the tenets of critical thinking and clinical decision making

to students to help them develop as responsible professional nurses who use valid evidence on which to base their care decisions. Use of simulation experiences helps students to learn and use the principles of critical thinking and inference in their clinical care decisions in a safe environment. As a result, the students are more willing to explore the application of these principles and develop their skills in a manner that will result in future positive healthcare outcomes for their patients and our community.

The findings of this study suggest that using CT and inference lead to positive initial experiences for the students. They will need to develop these skills further in the remainder of their programs as they progress toward professional nursing roles. The instruction leads the students to initially apply CT and inference subskills that are useful to their thinking in simulation scenarios. This initial practice paves the way to apply these skills in future simulation and clinical experiences. The outcomes of this study exceeded my expectations and taught me that I am able to lead students to a genuinely greater understanding of their own decision-making capabilities as future professional nurses. Now, I feel much more comfortable with respect to teaching CT and inference skills to student nurses to promote stronger, responsible, and ethical clinicians who can make a difference in the lives of their patients and provide better health in our nation. I look forward to watching how this innovative intervention may be used in my college in future classes with generations of new learners who will become future professional nurses.

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APPENDIX A  
IRB APPROVAL



EXEMPTION GRANTED

Ray Buss  
 Division of Educational Leadership and Innovation - West  
 602/543-6343  
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Dear Ray Buss:

On 2/9/2016 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Fostering Critical Thinking in Baccalaurate Nursing Students
Investigator:	Ray Buss
IRB ID:	STUDY00003742
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Recruitment-Consent Form, Category: Consent Form;</li> <li>• IRB Protocol, Category: IRB Protocol;</li> <li>• Examples Types of Survey Items, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> <li>• Letter of Support from SLR in Nursing School, Category: Other (to reflect anything not captured above);</li> </ul>

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 2/9/2016.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Kathleen Lupone

APPENDIX B  
CRITICAL THINKING SURVEY

Critical Thinking Survey  
NUR 323

Unique identifier: \_\_\_\_\_

Date: \_\_\_\_\_

To maintain confidentiality of your responses, we will use a unique identifier code made up of letters and numbers, rather than your name, for data analysis. To create this unique code, please record the first three letters of your mother's first name and the last four digits of your phone number. [For example, the first 3 letters of your mother's first name (ex. mar); and the last 4 digits of your phone number (ex. 0789). Thus, the code would be mar0789.] Be certain to put your unique identifier on the line above.

Please complete the following brief survey. This survey is confidential and will not affect any grade you receive in NUR 323. None of your answers will be published in connection with any activity in this course. Please consider each question carefully. Mark your answers directly on this survey.

Use the following scale: 6 = *Strongly Agree*, 5 = *Agree*, 4 = *Slightly Agree*, 3 = *Slightly Disagree*, 2 = *Disagree*, and 1 = *Strongly Disagree*.

	Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
1. Critical thinking is useful to make valid clinical patient care decisions.	6	5	4	3	2	1
2. I engage in critical thinking when I plan care for patients.	6	5	4	3	2	1
3. I thoughtfully ask questions about data I use to make health care decisions.	6	5	4	3	2	1
4. I critically evaluate evidence I have gathered about a patient.	6	5	4	3	2	1
5. I carefully assess the evidence about a patient before I make a decision about care.	6	5	4	3	2	1
6. I speculate about alternatives as I think about a patient's care.	6	5	4	3	2	1
7. I "brain storm" options as I consider care decisions for a patient.	6	5	4	3	2	1
8. I develop different "hypotheses" about ways to care for a patient.	6	5	4	3	2	1

	Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree	Strongly Disagree
9. I routinely use evidence to determine a conclusion about how to proceed with patient care.	6	5	4	3	2	1
10. When I make a care decision, I draw logical conclusions based on evidence.	6	5	4	3	2	1
10. When I make a care decision, I draw logical conclusions based on evidence.	6	5	4	3	2	1
11. I consider all the possible consequences as I draw conclusions about patient care.	6	5	4	3	2	1
12. I am confident in my ability to apply critical thinking skills as I solve nursing care problems.	6	5	4	3	2	1
13. Critical thinking is essential for effective patient care.	6	5	4	3	2	1
14. Critical thinking instruction improves my clinical decision making skills.	6	5	4	3	2	1
15. I use critical thinking to support my clinical decision making.	6	5	4	3	2	1

My definition of critical thinking is:

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My gender is: \_\_\_ Female \_\_\_ Male

My age is: \_\_\_\_\_

## APPENDIX C

### QUALITATIVE REFLECTIVE JOURNAL PROMPTS

## Qualitative Reflective Journal Prompts

The following is an adapted outline of the students' reflective journal done as a weekly assignment. Week 1 and either Week 4 or 5 this format will be used to gather qualitative data from the participants. Two journals will be used during the rotation (7 weeks) for the students to reflect on their CT process during simulation.

### REFLECTIVE JOURNAL

Instructions: Please complete this reflective process as instructed by your faculty. Avoid being repetitive even though the questions seem repetitive. The goal is to explain your critical thinking in simulation experiences for deep learning.

**WHAT WERE YOUR GOALS FOR THIS WEEK, AND HOW DID YOU PREPARE FOR THE SIMULATION EXPERIENCE?**

#### NOTICING:

- (1) Describe the situation that you encountered this week in simulation—what stood out to you from this weeks' experience? Describe what happened.

#### INTERPRETING:

- (1) Describe what you thought about the simulation situation? (e.g. possible explanations for what was happening?) Analyze your assumptions and beliefs regarding the simulation situation.
- (2) What did you feel about what happened?
- (3) Describe any similar situations you have encountered professionally or personally in the past?
- (4) What other information do you need?

#### RESPONDING:

- (1) What did you do in response to your thoughts and feelings about the situation?
- (2) What alternative responses would you consider to resolve the situation or patient problem?

#### REFLECTION-IN-ACTION

- (1) What was the outcome of the simulation situation?
- (2) How did the client and/or others in the environment respond?
- (3) What did you do next?

#### REFLECTION-ON -ACTION

- (1) What did you learn from this simulation situation? (an Ah Hah! Moment)
- (2) What went well?
- (3) What would you do differently in this or a similar situation?
- (4) What help do you need to get the most from this learning experience?

### APPENDIX D

## STUDENT INTERVIEW QUESTIONS

## Student Interview Questions

1. Based on your efforts in NUR 323, describe your understanding of clinical reasoning.
  - a. *Follow up?* Describe how clinical reasoning is used in nursing practice.
  - b. *Follow up?* Describe your efforts to use clinical reasoning in your nursing activities.
  
2. Based on your efforts in NUR 323, discuss how inference is used in nursing practice.
  - a. *Follow up?* Describe your experience using inference in your nursing activities.
  
3. Based on your efforts in NUR 323, discuss how querying evidence is used in nursing practice.
  - a. *Follow up?* Describe your experience using querying evidence in your nursing activities.
  
4. Based on your efforts in NUR 323, discuss using conjecturing alternatives in nursing practice.
  - a. *Followup?* Describe your experiences using conjecturing alternatives/ developing hypotheses in your nursing activities.
  
5. Based on your work in NUR 323, discuss drawing valid conclusions in nursing practice.
  - b. *Follow up?* Describe your experiences using drawing valid conclusions in your nursing activities.
  
6. Based on your work in NUR 323, discuss reflection in nursing practice
  - a. *Followup?* Discuss the use of reflection in your nursing activities.
  - b. *Followup?* Discuss the use of interpreting in your reflection on these simulations.
  
7. How has learning the inference process helped to develop your clinical reasoning skills?