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Influence of Questioning on Development of Clinical Reasoning in Prelicensure Nursing

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This is to certify that the doctoral dissertation by

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has been found to be complete and satisfactory in all respects,
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Walden University
2021

Abstract

Influence of Questioning on Development of Clinical Reasoning in Prelicensure Nursing

Students

by

Teresa M. Brown

MSN, Troy University 1986

BSN, Barry University 1978

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Nursing Education

Walden University

November 2021

Abstract

Clinical reasoning is the basis for every clinical decision a nurse makes; however, only 23% of newly graduated nurses are safely able to recognize urgent clinical patient problems and demonstrate appropriate management of those problems. Furthermore, new nurses make 50% of medical errors. This leaves nurse educators looking for evidenced-based teaching/learning strategies to help their students develop clinical reasoning skills. The purpose of this study was to investigate the influence of questioning as a problem-based teaching/learning strategy on clinical reasoning in undergraduate nursing students. The theoretical framework used to guide this study was Tanner's clinical judgment model. Using Lasater's clinical judgment rubric, a quantitative comparative ex post facto design was used to examine the difference in students' levels of clinical reasoning before and after undergoing a simulation intervention with questioning. The sample ($N = 35$) for this retrospective data consisted of undergraduate nursing students' responses obtained by course faculty between 2017 and 2019 from a small community college in the southeastern United States. Results of the paired t test analysis indicated a significant difference ($p < 0.05$) in clinical judgement in the pre ($M = 26.57$, $SD = 3.432$) and post ($M = 31.00$, $SD = 3.106$) intervention scores indicating an increase in clinical reasoning. Results may promote positive social change as nurse educators incorporate questioning as a strategy used after clinical simulation to aid in clinical reasoning and judgement development for students. Future studies might include randomization with a larger sample controlling for student demographics or previous degree status.

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Dedication

I would like to dedicate this dissertation to my family. To my husband David, while you were unable to be a part of this journey, your love enveloped my every step of the way. To my loving parents, Vince and Paula McCauley, you gave me opportunities that have guided my love and quest for knowledge throughout my life. To my brothers, Tom and Vincent, sister-in-law Lori, nephew Brian, and mother-in-law Deanne, you have supported and encouraged me every step of the way. Dear family, you were my motivation and inspiration, always beside me in my journey. I love you all very much.

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I would like to acknowledge my Director, Dr. Bridgett Jackson and my colleagues at Chattahoochee Valley Community College for their encouragement and support throughout this journey.

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Chapter 1: Introduction to the Study

To obtain optimal patient outcomes, nurses need to reason clinically and make sound clinical judgments (Dickson et al., 2018; Jessee, 2018; Tyo & McCurry, 2019). The ability to recognize changes in patients' conditions, perform timely and appropriate patient assessments, analyze data, and make sound clinical judgments are key to the successful transition from nursing school into clinical practice (Tyo and McCurry, 2019). However, nurse educators are not consistent in fostering the knowledge, skills, and attitudes necessary to effectively practice in a complex healthcare environment as many new graduate nurses are not practice ready, especially when it comes to clinical judgments (Parker et al., 2014). Tyo and McCurry (2019) noted a significant problem for academia is a gap in the literature identifying educational strategies that are effective in the development of clinical reasoning. Furthermore, I also identified few educational strategies that were effective in the development of clinical reasoning in nursing students. Desiring to make graduate nurses more practice ready with an increase in clinical reasoning skills, nurse educators at a small community college in the southeastern United States were willing to try different educational strategies to assist in the development of clinical reasoning skills. While the educational intervention of questioning was implemented at the site, no one had evaluated the strategy for effectiveness. Implementing educational strategies without empirical evidence on their effectiveness in the development of clinical reasoning left the educators guessing if the strategies would be effective. By developing and testing a range of evidenced-based teaching/learning strategies that assist in the development of clinical reasoning, a systematic approach to

clinical reasoning could be embedded in nursing programs curricula, easing new nurse graduates' transition into practice (Parker et al., 2014). This addition of evidenced-based teaching/learning strategies will add currency to the knowledge base of nursing education. Stevens (2013) also concurred that teaching strategies used by nurse educators should be based on sound evidence.

Nurse educators are challenged to shift their emphasis on critical thinking to clinical reasoning as they prepare nurses to care for more complex patient problems commonly seen in healthcare today (Benner et al., 2010). This shift in nursing education allows graduate nurses to consider the what-if questions by using creative, critical, scientific, and critical thinking to make sound clinical decisions. However, few studies have investigated specific teaching/learning strategies to assist in the development of clinical reasoning in nursing students. The topic of this study was to evaluate the influence of questioning as a problem-based teaching/learning strategy on the development of clinical reasoning in undergraduate nursing students.

The vision of Walden University is working to foster social change through research, practice, and the education of motivated scholar-practitioners (Walden University, 2017). This study may evoke positive social change by influencing nursing students, nursing faculty, patients, and healthcare providers. In addition, the results of this study may increase evidenced-based knowledge concerning learning strategies to promote clinical reasoning in nursing students allowing them to make better clinical judgments as they transition into practice. Facilitating the development of clinical reasoning in nursing students is critical to achieving desirable patient outcomes.

Chapter 1 will cover the background of the problem, the problem statement, the purpose of the study, the research question and hypotheses, the theoretical framework for the study, and the nature of the study. In addition, I will include a definition of terms, my assumptions, and the scope and delimitations of the study. Any limitations identified will be discussed as will the significance of the study.

Background

Healthcare partners in a community in the southeastern United States identified a problem with new graduates not being practice ready, specifically presenting with limited clinical reasoning skills. Through a search of the literature, it was identified that this problem was not specific to the southeastern United States. Instead, various studies identified a widening preparation-to-practice gap with a focus on clinical reasoning (Gonzalez, 2018; Kavanagh & Szweda, 2017; Silvestre et al., 2017; Tyo & McCurry, 2019). Educators in the small community college where this study took place set out to identify educational strategies that could assist students in the development of clinical reasoning skills.

Merisier et al. (2018) posited that problem-based learning (PBL) has been implemented successfully as a learning strategy to promote clinical reasoning in other healthcare fields. PBL is a strategy developed in the late 1960s at the McMaster University Medical School in Hamilton, Ontario, Canada (Jones, 2008). This PBL strategy utilizes active and self-directed learning to promote analytical reasoning, communication, and team problem-solving skills (Jones, 2008). Problems provide the foundation for discussions rather than traditional lecture driven classrooms, developing

problem solving skills for real life problems (Breytenbach et al., 2017). PBL would assist nursing students in the ability to ask those what-if questions using a variety of ways of thinking and reasoning as they make clinical judgments.

Merisier et al. (2018) concluded that determining the most effective strategies to develop clinical reasoning was key to a safe and successful transition into practice. While researching teaching/learning strategies that were most effective in facilitating clinical reasoning, I found few studies that focused on specific teaching/learning strategies in the development of clinical reasoning in nursing students (Breytenbach et al., 2017). Of the studies identified, most were on outcome measures that were questionnaires, self-reporting surveys, transcript analysis, verbal analysis, and exams or tests (Burbach et al., 2015; Chan, 2014; Harmon & Thompson, 2015; Jessee & Tanner, 2016). Many of these studies described by Breytenbach et al. and Tyo and McCurry were over 8 years old, were tested in BSN programs, and used a mixture of methodologies to include quantitative, qualitative, and mixed-methodology (Breytenbach et al., 2017; Tyo and McCurry, 2019). The use of case studies as an educational strategy was evaluated by exam, questionnaires, transcript analysis, direct observation, and self-reporting surveys in several studies (Carvalho& Oliveria, 2011; Dawson et al., 2014; Russell et al., 2011). Reflective journaling, another strategy studied by Murphy (2004), supported the development of clinical reasoning. Other educational strategies studied in the development of clinical reasoning included clinical coaching (Jessee & Tanner, 2016), collaborative learning (Harmon & Thompson, 2016), and several studies evaluated the use experiential or clinical practicum (Kubin et al., 2013). Another evaluated method is

the use of the outcome present state test by Kautz et al. (2006). Even with the extensive research on teaching strategies for the development of clinical reasoning in prelicensure nursing students, graduate nurses continue to fall short in clinical reasoning skills making them less than practice ready to handle the complex healthcare issues of today. More teaching strategies need to be investigated.

I launched a quantitative study examining the effect of questioning as a teaching/learning strategy in an associate degree nursing program. Evidence-based knowledge on the educational strategy of questioning was not found in my review of the literature and is therefore recognized as a gap in knowledge. For this study, I identified the influence that questioning had on the development of clinical reasoning, adding to the knowledge base of teaching/learning strategies in the development of clinical reasoning among nursing students.

Problem Statement

Clinical reasoning is the basis for every decision made by nurses and with sound clinical reasoning skills, a positive impact on patient outcomes is possible (Merisier et al., 2018). Academic programs have a commitment to develop and assist students to graduate with the skills, knowledge, and abilities to provide safe, competent care (Kavanagh & Szweda, 2017). The NCLEX (National Council Licensing Examination) pass rate has been the standard by which most programs are evaluated. However, graduate nurses who passed NCLEX continue to the workforce without the confidence and clinical reasoning skills needed to make sound clinical judgments in today's healthcare (Kavanagh & Szweda, 2017). Only 23% of newly graduated nurses are safely able to recognize

problems due to urgent changes in patient condition and demonstrate appropriate

management of those problems (Kavanagh & Szweda, 2017). The National Council of

State Boards of Nursing ([NCSBN]; 2019) stated that while knowledge is essential, there

was not enough evidence to show that nurses possessed the clinical judgment essential

for safe nursing practice with the current NCLEX. NCSBN is currently undertaking a

radical transformation of the NCLEX to assess higher-order thinking. Dickison (as cited

in NCSBN, 2019) posited that the overall goal of assessing if a nursing candidate is

minimally competent is a public protection issue.

Nurses with sound clinical reasoning skills have a positive impact on patient

outcomes (Billings & Halstead, 2016), conversely, comparatively poor reasoning skills

may result in adverse patient outcomes (Benner, 2015; Tyo & McCurry, 2019). New

graduate nurses have reported that the development of clinical reasoning was critical to

the basis of their ability to recognize cues and prevent failure to rescue (Herron, 2017).

Yet, most new graduates are not practice ready, especially when it comes to making

sound clinical judgments (Parker et al., 2014). Having graduate nurses who are not

practice ready presents a quality and safety issue for healthcare. Harmon and Thompson

(2015) concluded that it is essential to foster clinical reasoning in order to provide safe,

effective nursing care. The complexity of healthcare today does not afford the luxury of

developing clinical reasoning after graduation, requiring graduate nurses to effectively

reason and make sound clinical judgments sooner than later (Herron, 2017). This places

the emphasis on the development of clinical reasoning skills on nursing programs. New

graduates are stressed by the expectations that they perform like a nurse with 20 years of

experience (Parker et al., 2014). This stress leads new nurse graduates to perceive themselves as unsafe practitioners in certain situations (Parker, et al., 2014).

Clinical reasoning and judgment are essential end of program outcomes for prelicensure nursing students (Bussard, 2018; Tyo & McCurry, 2019). With the increasing complexity of patient problems, nursing graduates must be able to adjust quickly to a patient's changing needs (Carvalho, et al., 2017). Being able to systematically analyze the situation and develop a solution is key to safe, quality healthcare. Teaching nursing students how to reason clinically will develop nurses who can adjust and problem solve in changing patient situations. Providing nurse educators with evidenced-based learning strategies for the development of clinical reasoning skills will help future nurses provide safe, quality care.

Nurse educators need evidenced-based strategies that will enable them to foster the development of nursing students capable of meeting complex healthcare needs (Jessee, 2018). Nurse educators are challenged to develop learning/teaching strategies and experience that would foster the development of clinical reasoning in nursing students (Harmon & Thompson, 2015). Determining the most effective strategies to develop clinical reasoning in nursing education is key to graduate nurse' successful transition into clinical practice and the achievement of desired patient outcomes (Carvalho, et al., 2017; Merisier et al., 2018; Tyo & McCurry, 2019). While researching teaching/learning strategies effective in the development of clinical reasoning, I found the following strategies studied: case studies and clinical scenarios, web-based case studies, case studies or clinical scenarios with structured model or theory, clinical coaching,

collaborative learning, concept mapping, experiential or clinical practicum, reflective journaling, and simulation. PBL has been implemented as a teaching/learning strategy to promote clinical reasoning in many healthcare fields (Barrows, 1996; Macarthur & Dwyer, 1989). Few studies have investigated the effects of specific PBL strategies on clinical reasoning (Harmon & Thompson, 2015; Jessee & Tanner, 2016).

Studies concerning PBL strategies involve the influence on critical thinking, not clinical reasoning, in nursing (Merisier et al., 2018). Carvalho et al. (2017) identified PBL as the most commonly used teaching intervention for critical thinking. The development and testing of teaching/learning strategies to foster the development of clinical reasoning in nursing students is in response to the challenge delivered by Harmon and Thompson (2015) to nurse educators.

Wosinski et al. (2018) posited that the goal of PBL is to improve clinical reasoning skills. They further noted that clinical reasoning fostered by PBL increased self-efficacy in:

- self-learning

- the use of clinical reasoning pathways

- solving of clinical problems

- transferring skills to clinical practice

- building knowledge as a team

- developing leadership skills.

Questioning is one of the most frequently used PBL strategies in raising a student's cognitive ability (Gilkison, 2003). Merisier et al. (2018) reasoned that questioning, as a

PBL teaching strategy, would influence clinical decision making. While it appears that the use of questioning influences clinical reasoning, there is no empirical evidence to support the assumption (Merisier et al., 2018).

The problem identified is two-fold. First, new nurse graduates are not practice ready when it comes to clinical reasoning and clinical judgment (Bussard, 2018; Herron, 2017; Jessee & Tanner, 2016; Parker et al., 2014). Nurses who are not able to clinically reason are more likely to make poor clinical judgments, leading to poor patient outcomes. A new graduate who enters the workforce with developed clinical judgment and reasoning skills can ensure safe, quality, and effective care in healthcare settings (Bussard, 2018). The second problem identified is a noted gap in the literature in identifying what educational strategies are effective in the promotion of higher-level thinking in nursing such as clinical reasoning (Tyo & McCurry, 2019). None of the identified strategies included PBL, even though PBL has been used in the development of clinical reasoning in other health related fields such as medicine (Barrows & Tamblyn, 1980; Barrows, 1986: Merisier et al., 2018). Because other healthcare disciplines use PBL in the development of clinical reasoning, I conducted additional research on questioning, the most used PBL strategy, in the development of clinical reasoning in prelicensure nursing students.

Purpose of the Study

The purpose of this study was to investigate the influence of questioning as a PBL strategy on clinical reasoning in prelicensure nursing students using secondary data from a nursing program from 2017-2019. PBL is one of the most widely used learning methods

to foster clinical reasoning (Merisier, et al., 2018). Because questioning is the most

prominent PBL strategy, the use of questioning has important implications for nursing

education in the investigation of effective learning strategies to development clinical

reasoning in undergraduate nursing students. In this study, I provided empirical evidence

on the use of questioning in the development of clinical reasoning in nursing students by

comparing the pre and post questioning evaluations using the Lasater clinical judgment

rubric. This study used a retrospective quantitative approach, with deidentified data from

the records of nursing students enrolled in their last lower-level clinical course, who were

required to participate in simulation experiences as a portion of their clinical experiences

for the specified clinical course. Data analysis examined the influence of questioning, the

independent variable, on clinical reasoning, the dependent variable using a paired t test.

Research Question and Hypotheses

Research Question (RQ)-Quantitative: To what extent does the use of questioning as a

problem-based learning strategy influence the development of clinical reasoning in

prelicensure nursing students?

> H_0: Questioning as a problem-based strategy has no influence on the development
>
> of clinical reasoning in prelicensure nursing students.
>
> H_a: Questioning as a problem-based strategy influences the development of
>
> clinical reasoning in prelicensure nursing students.

The variables were measured using the Lasater Clinical Judgment Rubric (Lasater, 2007).

Paired t test analysis was conducted using SPSS to evaluate the difference in the levels of

clinical reasoning before and after the intervention of questioning was implemented. The

paired *t* test was used because there is one group being evaluated with pre and postintervention evaluation. G* Power 3.1.94 was used to calculate a prior sample size for selection of data to include in the analysis (Faul et al, 2007). Data was secondary data provided by a small community college in the southeastern United States from students in their last clinical lower-level course from the years 2017-2019.

Theoretical Framework

The theoretical framework used to guide this study was Tanner's clinical judgment model. Tanner's clinical judgment model consists of four components: noticing, interpreting, responding, and reflecting (Tanner, 2006). *Noticing* is the perceived judgment of the situation: What are the nurse's expectations of the situation? Expectations are based on the nurse's knowledge of the patient in determining if this a normal pattern of response for the patient. Expectations are also based on the nurse's knowledge and previous experiences. *Interpreting* is the process that allows the nurse to grasp the situation and begin using reasoning to make sense of the data. This allows the nurse to determine if more data is needed to interpret the situation accurately. By interpreting the meaning of the data, the nurse then determines an appropriate plan of action or the response to the situation. *Responding* is the plan of action developed by the interpretation of the data or may be either intuitive or implied. This response must be evaluated for effectiveness. *Reflecting*, the last component of the clinical judgment model, is accomplished by one of two methods: reflection-in-action and reflection-on-action. *Reflection-in-action* is interpreting the patient's response to the action taken. *Reflection-on-action* is taking a step back and reflecting about what was learn from this

situation. This ongoing learning from reflection contributes to the nurse's clinical judgment and their ability to take this knowledge and apply it to future clinical judgments.

Clinical reasoning is evident in all components of the clinical judgment model. Tanner (2006) defined clinical judgment as an "interpretation of the patient's needs, concerns, or health problems and the decision to take action" and clinical reasoning as "the process by which nurses and other clinicians make their judgments" (p. 204). This approach details how nurses think and the clinical reasoning behind their judgments.

Tanner's clinical judgment model was chosen for this study due to the clarity and ease of use of the model. I chose the Lasater clinical judgment rubric (LCJR) as my measurement tool due to its alignment with Tanner's clinical judgment model. Lasater's clinical judgment rubric consists of 11 areas for evaluation within the four components of the clinical judgment model. Effective noticing is evaluated with focused observation, recognizing deviations from expected patterns, and information seeking. Effective interpreting involves prioritizing data and making sense of the data. Effective responding involves a calm manner in which the situation is approached, clear communication, well planned interventions to include flexibility in response, and skill. Last, effective reflecting involves self-analysis and a commitment to improvement.

This theory aligns well with the research topic of the influence of questioning on the development of clinical reasoning in nursing students. The clinical judgment model through LCJR provides an opportunity to evaluate questioning on the development of clinical reasoning. Clinical reasoning is the process a nurse uses to make a clinical

judgment. The four aspects or dimensions of noticing, interpreting, intervening, and reflection lends itself to evaluation of the process of clinical reasoning.

Nature of the Study

A quantitative, comparative study using a one group ex post facto design with secondary data was selected to provide a means of testing for improvement in clinical reasoning after a new method was implemented (Creswell, 2014). Identified variables included the independent variable of questioning and the dependent variable of clinical reasoning. Variables were measured by the LCJR by assigning a numerical value to the 11 components of the rubric. This instrument allows the evaluator to assign a total score for clinical judgment and reasoning using the students level of expertise of each component. The level of expertise ranged from beginning (1 point) to exemplary (4 points). The student's clinical judgment and reasoning was evaluated based on secondary data obtained before and after questioning using the LCJR. Data was analyzed using a paired *t* test. For this study, I used a quantitative one group pre/postintervention approach to investigate the difference between the preintervention clinical reasoning score and the postintervention clinical reasoning score following the intervention of questioning.

The simulation experience that was the foundation for the data used for this retrospective study included a series of questions designed to encourage a deeper thought process. The simulation was a required clinical component of the nursing program. Clinical reasoning is the thought process that healthcare professionals use to make clinical judgments (Vallente, 2016, p. 1). The quasi-experimental one group ex post facto design will be used to examine the retrospective data (Grove et al., 2013). The quasi-

experimental design is less rigorous than an experimental design that uses a randomized sampling and a control group. The student data was obtained from student records from a small community college in the southeastern United States. The students engaged in the simulation and then were evaluated prequestioning by using a clinical judgment tool. Following the guided questions, the students repeated the simulation and were reevaluated postquestioning using the same clinical judgment tool.

The clinical judgment tool was developed by the college using the components of Lasater's clinical judgment rubric. The students' work, at that time, were evaluated by their simulation faculty as satisfactory or unsatisfactory. I used the LCJR to quantitatively evaluate the students' work. The LCJR is a grading tool that describes the students' levels of performance in clinical judgment, focusing on the process of clinical reasoning (Lasater, 2007). Keeping the focus on clinical reasoning remains consistent with Tanner's (2006) components of noticing, interpreting, responding, and reflecting and can easily be evaluated using the LCJR due to its close alignment with the clinical judgment model (Lasater, 2007).

Operational Definitions

The following terms were used throughout the study. Listed below are the definitions of the terms.

Clinical judgment is defined as "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriately by the patient's response; (Tanner, 2006, p. 204)

Clinical reasoning is "the thought process by which healthcare professionals gather and analyze patient information, evaluate the relevance of the data, and identify potential actions that could improve the physiological and psychosocial conditions of patient under their care" (Vallente, 2016, p. 1).

Critical thinking is "the ability to apply higher-order cognitive skills (conceptualization, analysis, evaluation) and the disposition to be deliberate about thinking (being open-minded or intellectually honest) that lead to action that is logical and appropriate (p. 716).

Cues are changes experienced by the patient, either physiological or psychological (Levett-Jones et al., 2010). The nurse perceives these changes through history and/or assessment based on knowledge and beliefs.

Interpreting is the making sense of what has been noticed by ruling out hypotheses until the interpretation supports the data noticed and collected (Tanner, 2006). This is the second component of Tanner's clinical judgment model.

Learning strategies are the methods students use to learn (Instructional Design, n.d.)

Noticing the perceived judgment of the situation (Tanner, 2006). This is the first component of the Tanner's clinical judgment model.

Nurse educators refers to the faculty who facilitate learning in undergraduate nursing courses.

Nursing students for this study are defined as prelicensure undergraduate nursing students.

Practice-ready refers to the possession of "skill proficiencies and competencies to be able to assume the responsibilities of a professional nurse following graduation and passing the NCLEX [National Council of Licensure Examination]" (Harmon & Thompson, 2015).

Problem-based learning is a learning strategy introduced in the late 1960s and is defined as the "learning that results from the process of working toward the understanding or resolution of a problem" (Barrows & Tamblyn, 1980, p. 18).

Questioning is defined as an "interrogative expression often used to test knowledge" or the "act or instance of asking" (Merriam-Webster, n.d.).

Reflecting is the fourth component of Tanner's clinical judgment model. Reflection is a self-evaluation of action and an evaluation of the situation with the intention of increasing knowledge and clinical judgment skills for the future (Tanner, 2006).

Responding is the third component of Tanner's clinical judgment model. Responding is the chosen action taken based on the nurse's interpretation of the situation (Tanner, 2006).

Teaching/learning strategies are defined as "the structure, system, methods, techniques, procedures and processes that a teacher uses during instruction" (NW Missouri, 2018).

Assumptions

Things that are believed to be true are assumptions and are not necessarily under the control of the researcher (Nieswiadomy & Bailey, 2018; Simon, 2011). Assumptions

may be implied from theory or research, universal assumptions, or common sense. For this study, I am making the following assumptions.

- Clinical reasoning affects patient outcomes (Harmon & Thompson, 2015; Jessee, 2018); Merisier et al., 2018; Vallente, 2016). Based on this assumption from previous studies, clinical reasoning becomes an appropriate variable in the study.

- Clinical reasoning should be taught in undergraduate nursing programs. Bussard (2018) stated in her study the importance of new graduate nurses entering the workforce being prepared to handle complex patient situations in order to ensure safe, quality, and effective patient care.

- Nurse educators should use evidenced-based teaching/learning strategies (Breytenbach et al., 2017). This assumption is the basis of all research on teaching/learning strategies. This study will increase the evidence-based strategies that influence clinical reasoning.

- Nursing students can be taught how to reason clinically (Breytenbach et al., 2017; deCarvalho et al., 2017; Tyo & McCurry, 2019). This assumption is well supported by research as noted above. Teaching nursing students how to use various types of thinking in the development of clinical reasoning will facilitate sound clinical judgments, resulting in better outcomes for patients (Harmon & Thompson, 2015).

- I assumed that participants provided their best responses on the clinical judgment tools based on the fact that the data was part of a required clinical experience.

Scope and Delimitations

I investigated the influence of questioning on clinical reasoning in prelicensure nursing students. Larue (2008) posited that PBL was shown to be favorable in the development of clinical reasoning skills. The choice of questioning as the teaching/learning strategy to be investigated was based on questioning being the most prominently used PBL strategy (Merisier et al., 2018). The use of questioning has important implications for nursing education with the investigation of effective teaching/learning strategies in undergraduate nursing students.

The scope or boundaries of the study were a convenience sampling of community college undergraduate nursing students from an associate degree nursing (ADN) program in the southeastern United States. The majority of the studies published on clinical reasoning teaching strategies from 1998 to 2016 were from baccalaureate nursing programs, while only two were from the community college setting (Tyo & McCurry, 2019). None of these studies investigated questioning as an education strategy (Tyo & McCurry, 2019). Inclusion criteria for this study included undergraduate nursing students in the same course with the same simulation experience. One researcher evaluated the data retrospectively to ensure consistency of the grading. Exclusion criteria included students from disciplines other than nursing and students who were not prelicensure nursing students.

While Tanner's clinical judgment model was selected as the theoretical framework for this study, other potential frameworks were considered. The National Council of State Boards of nursing clinical judgment model was considered. This model

encompasses three of the leading clinical judgment models: Tanner's clinical judgment

model, dual process reasoning theory, and the information processing model (Dickison et

al., 2018). This is a multilayered clinical judgment model that forms, defines, and

evaluates hypotheses. This model did not lend itself to studying questioning as a

teaching/learning strategy as easily as Tanner's clinical judgment model. The dual

process reasoning theory was also considered. This theory set its roots in Hammond's

cognitive continuum theory (1978). Hammond (1978) describe clinical judgment as an

adaptive strategy lying between intuitive and analytical thinking. This theory aligned well

but was difficult to align with a measurement tool. Also considered was the NLN/Jeffries

simulation model. It was discarded due to the measurement tool evaluating students'

perceptions instead of assessing development of students' clinical judgment.

The quasi-experimental design is less rigorous than an experimental design due to

the use of a convenience sampling. This method of nonrandom sampling limits the

probability that each element of the population will be included in the sample

(Nieswiadomy & Bailey, 2018). Generalizations are restricted with this sampling method.

Limitations

There are three limitations identified with this study. The first is the use of a

convenience sample which does not allow for the study to be generalized to a larger

population (Simon, 2011). This sample may not be a true representation of all

prelicensure nursing students in a variety of settings and circumstances (Creswell, 2014).

The second limitation is that there is no way of knowing if clinical reasoning was

impacted by previous knowledge, experience, or skills. The whole cohort was used to

help minimize the risk of statistical regression since students' knowledge, skills, and experiences are varied. The comparison of pretest and posttest evaluation data allowed for a determination of growth in clinical reasoning based on the use of questioning regardless of their starting point. This sample represented nursing students in a small community college and may not be representative of larger populations. Replication of this study in other types of prelicensure nursing programs, such as a diploma or BSN program, would address this limitation.

Another limitation was time. This study evaluated retrospective data from nursing students in one semester, with a pre and postevaluation of the intervention of questioning. This snapshot in time is dependent upon conditions at that time. All students were given material to prep them for the simulation to ensure that all student has a solid knowledge base prior to the simulation.

Using data collected on multiple small groups throughout the semester could present a problem with contamination of the data. However, to allow all students the opportunity for the same experiences in simulation lab, students were required by the college to sign a confidentiality agreement to not discuss simulations outside of Sim Lab. While I had no control on the conditions in which the secondary data was collected, I am reasonably confident that the college's standards were maintained. I will be the sole evaluator of the retrospective data to ensure consistency of grading.

Significance of the Study

In a scoping review of the literature, Merisier et al. (2018) were unable to find any evaluation of the influence of questioning on the development of clinical reasoning. I also

completed a thorough review of the literature and was unable to find any evaluation of the influence of questioning on clinical reasoning to corroborate questioning as an effective strategy in the development of clinical reasoning. Breytenbach et al. (2017) concluded in their integrative literature review on the best available literature on evidenced-based teaching strategies for nurse educators was very limited, recommending that researchers investigate the best use of teaching strategies. This current study provided empirical evidence on the use of questioning as a PBL strategy in the development of clinical reasoning in nursing students. This study assisted in filling the gap in the literature on effective educational strategies for the development of clinical reasoning in nursing students.

This study may evoke positive social change by influencing nursing students, nursing faculty, patients, and healthcare providers. This study increases evidenced-based knowledge concerning learning strategies to promote clinical reasoning in nursing students allowing them to make better clinical judgments as they transition into practice. Facilitating the development of clinical reasoning in nursing students is critical to achieving desirable patient outcomes. Students need to become more comfortable with changing patient conditions, recognizing cues, considering patient and family concerns, and using sound clinical reasoning to intervene as necessary. Students with sound clinical reasoning skills are more practice ready, have more confidence, and transition as new graduates into practice more easily (Parker, et al., 2014).

This study, by increasing the knowledge of evidenced-based teaching/learning strategies, has significant implications for social change. The use of evidence-based

teaching/learning strategies give nurse educators the tools to effectively impact the knowledge, skills, and attitudes in development of clinical reasoning in nursing students. The complexity of healthcare today does not afford nursing the luxury of developing clinical reasoning after graduation, as suggested by Herron (2017). Herron (2017) posited that new graduate nurses felt that the development of clinical reasoning was critical as it was the basis of their ability to recognize and prevent failure to rescue.

Nurse educators should adopt learning strategies that are evidenced-based (Breytenbach et al., 2017). There is a need for evidenced-based strategies that will develop nursing students capable of meeting complex healthcare needs. Evidenced-based learning strategies will allow for better curriculum development.

Having a nurse who can rapidly identify changes in conditions and respond appropriately and timely will improve patient outcomes. Lives depend on a nurses' ability to make sound clinical judgements, making this a priority competency in nursing education. Failure to identify and interpret cues in a timely manner can lead to devastating consequences for the patient. Robeznieks (2015) reports that the New York-based Jonas Center for Nursing Excellence estimates that each nurse educator has the potential to affect the care of 3.6 million patients. This number is based on the number of nurses each instructor could teach along with the number of patients for whom those nurses could provide care (Robeznieks, 2015). Improving the clinical reasoning skills of nursing students truly effects millions of patients. Better patient outcomes will have the potential to reduce inpatient length of stay with more efficient care. More efficient care can potentially lend to a saving of resources and dollars for healthcare in general.

Practice-ready new graduates have the potential to decrease orientation costs of new graduates. The readiness of new graduates to enter the workforce is an international concern creating not only the necessity of longer orientation programs, but many hospitals have added extended residency programs for new graduate support (Baumann et al., 2017; Parker et al., 2014).

Summary and Transition

The problem that motivated this research was the insufficiency of practice ready graduate nurses capable of handling the complex patient problems experienced in healthcare today, especially related to clinical judgments. Clinical reasoning is the process nurses use to make sound clinical judgments. The rationale for choosing this problem was the challenge made to nurse educators for the development of teaching/learning strategies that would foster clinical reasoning in nursing students by Herron and Thompson (2015). In other healthcare fields, PBL is a frequently used educational strategy for the development of clinical reasoning. However, there is little research on individual PBL strategies (Breytenbach et al., 2017). Questioning was selected as the teaching/learning strategy to research within the theoretical framework of Tanner's clinical judgment model.

The study used a quantitative approach consistent with determining the cause-and-effect relationships between the independent variable "questioning" and the dependent variable "clinical reasoning." Key terms relative to the problem were identified, as well as assumptions, scope, delimitations, and limitations. The significance

of the study was emphasized as well as its impact on social change. The literature review

will be discussed in Chapter 2.

Chapter 2: Literature Review

Nurse educators should shift emphasis on critical thinking to clinical reasoning as they prepare nurses to handle the complex patient problems likely to be encountered in today's healthcare (Benner et al., 2010). Benner et al (2010) posited that nurses need multiple ways of thinking, including clinical reasoning with the use of clinical imagination. Benner et al. (2010) defined *clinical reasoning* as the "ability to reason as a clinical situation change, taking into account the context and concerns of the patient and family" (Benner et al., 2010, p. 85). This shift in nursing education allows graduate nurses to consider the what-if questions by using creative, critical, scientific, and thinking to make sound clinical decisions. However, few studies have investigated specific teaching/learning strategies to assist in the development of clinical reasoning in nursing students.

This literature review was a detailed summary of (a) the influence of PBL on clinical reasoning and clinical judgment, (b) problem-based teaching/learning strategies utilized in developing clinical reasoning and clinical judgment in nursing students, (c) the need to develop clinical reasoning skills in nursing students, and (d) the conceptual frameworks of Tanner's clinical judgment model and Lasater's clinical judgment tool and rubric. After discussing my search strategies, including databases accessed and key terms used, I reviewed the theoretical framework used, Tanner's clinical judgment model (Figure 1). The main portion of this chapter is the literature review is where I addressed the following concepts: clinical reasoning/clinical judgment, PBL, and questioning/inquiry.

Figure 1

Tanner's Clinical Judgment Model
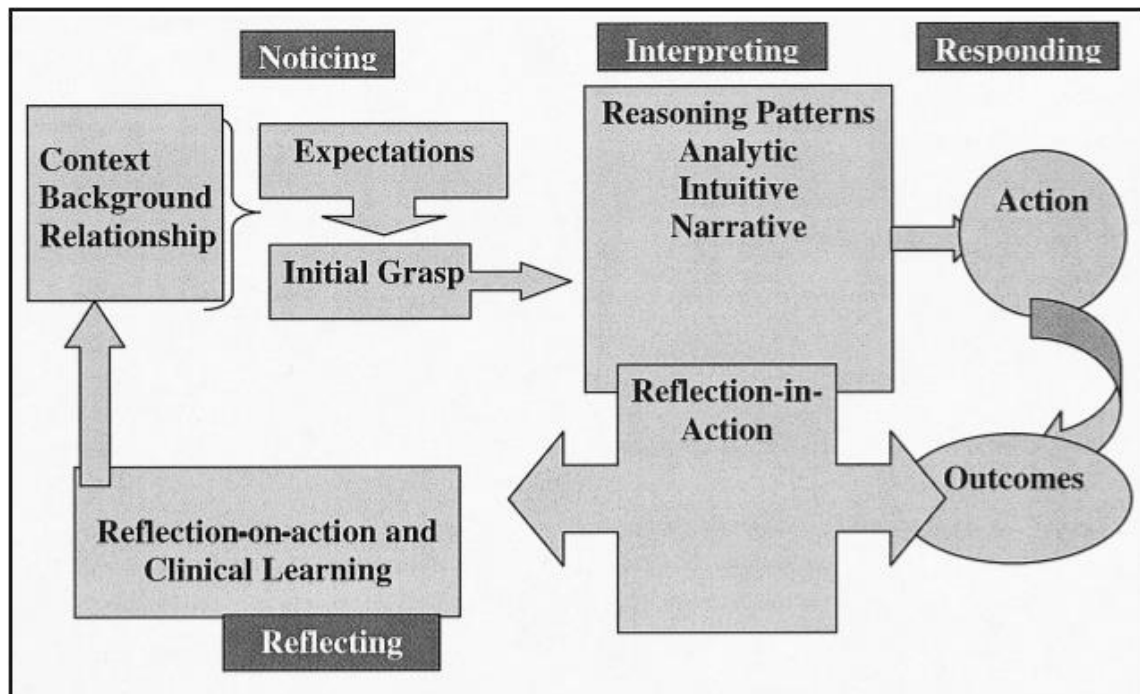
Note. Tanner's Clinical Judgment model depicting the four components of noticing, interpreting, responding, and reflecting. Adapted from "Thinking Like a Nurse: A Researched-Based Model of Clinical Judgment in Nursing" by C. A. Tanner, 2006, *Journal of Nursing Education, 45*(6), p. 208.

Literature Search Strategies

I searched nursing and education databases to identify articles relative to the development of clinical reasoning. Inclusion criteria for the literature review included studies from the discipline of nursing, prelicensure nurses, PBL, questioning/inquiry, and educational strategies that were specific to clinical reasoning. Studies were excluded if they were (a) not empirical, (b) conference abstracts, (c) dissertation papers, (d) written in

a language other than English, (e) did not include prelicensure nurses and (f) were deemed irrelevant in contributing to the research questions. The databases used included CINAHL, MEDLINE, OVID, and EBSCO, ProQuest Nursing, and ERIC. Key search terms included *clinical reasoning, clinical judgment, nursing education, learning strategies, teaching strategies, problem-based learning, questioning, inquiry, Tanner's Clinical Judgment Model, and Lasater's Clinical Judgment Rubric*. Boolean searches included the following combinations: *clinical reasoning* OR *clinical judgment* AND *nursing education* AND *learning strategies*; *clinical reasoning* OR *clinical judgment* AND *nursing education* AND *problem-based learning*; *problem-based learning* AND *learning* OR *teaching strategies* AND *clinical judgment* OR *clinical reasoning*; *clinical reasoning* OR *clinical judgment* AND *nursing education* AND *questioning* OR *inquiry*. The terms that yielded the greatest results were *clinical reasoning, clinical judgment, problem-based learning, and nursing education.* Tanner's clinical judgment model and Lasater's clinical judgment rubric were added the search as a possible theoretical model and tool for measuring clinical judgment for the research.

The scope of the literature review was limited to the years between 2013 and 2019. The literature searches were conducted using the Walden University online library, online nursing and health professional journals, textbooks, and various nursing websites. The literature search continued until saturation was met. This was determined when search items yielded repetitive results among the databases.

Included are the seminal works of Barrows (1986) and Barrows and Tamblyn (1980) on PBL in the review. Other seminal works included were Tanner's (2006)

clinical judgment model, Lasater's (2007) clinical judgment rubric. *Educating Nurses: A Call for Radical Transformation* (Benner et al., 2010) was also included due to the frequency of reference in various studies as a driving force to move from critical thinking to clinical reasoning in the development of nurses.

Theoretical Foundation

Tanner's clinical judgment model is the foundation for many studies on clinical reasoning and clinical judgment (Ashley & Stamp, 2014: Bussard, 2015; Jessee & Tanner, 2016; Monagle, Lasater, Stoyles, & Dieckmann, 2018). Tanner (2006) developed the clinical judgment model based on five general conclusions acquired from her review of almost 200 studies concerning clinical judgment. These conclusions are: (1) nurses' previous experience, background as well as objective data concerning the situation; (2) knowing patients' typical pattern of responses as well as patient engagement; (3) context in which the situation occurred and the culture of the unit; (4) reasoning patterns used by nurses; and (5) reflection on any breakdown of clinical reasoning to improve future outcomes (Tanner, 2006).

It is important to define terms relevant to the clinical judgment model. Tanner (2006) defines *clinical judgment* as "an interpretation or conclusion about a patient's needs, concerns or health problems, and/or the decision to take action (or not), use or modify approaches, or improvise new ones as deemed appropriate by the patient's response" (p. 204). Tanner (2006) referred to the term *clinical reasoning* to describe the processes nurses and other clinicians use to make clinical judgments. Tanner (2006) describes these processes as a deliberate generation of alternatives, to include a

comparison to the evidence and choose what is most appropriate for the patient. This process includes identifying patterns of practical reasoning, the recognition of patterns, intuitive clinical grasp, and responding without evident forethought.

The clinical judgment model consists of four aspects based on a synthesis of the literature on clinical judgment; noticing, interpreting, responding, and reflecting (Figure 1) *Noticing* is the perceived judgment of the situation. For example, to ascertain the concept of noticing a researcher might ask whether the nurses' expectations concerning the patient condition being met or not? The nurses' expectations are based on previous experience of similar patients and/or situations, knowledge of the patient and their patterns of responses, and knowledge from textbooks. Factors such as the nurses' vision of excellent care, nursing unit culture and patterns of care on the unit, nurses' values concerning the situation, and the work environment all have the potential to influence what is noticed (Tanner, 2006). *Interpreting,* the second aspect of clinical judgment, is the development of sufficient understanding to respond to the situation. This process uses reasoning patterns to interpret the data, develop hypotheses that supports the data, and determine an appropriate response. *Responding* is the chosen course of action to the situation. The response may be a decision based on a deliberate reasoning process as discussed above, or it may be intuitive where response to the intervention confirms the action.

The final aspect of the clinical judgment model is *reflecting*. There are two parts to this aspect. Reflection-in-action and reflection-on-action. *Reflection-in-action* refers to the nurses' ability to evaluate the patient and make adjustment to the course of action is

the desired outcomes are not being achieved. *Reflection-on-action* refers to the clinical

learning that the nurse gains from the experience.

Tanner's clinical judgment model has been used as the theoretical framework for

studies on clinical judgment and clinical reasoning. Ashley and Stamp (2014) used

Tanner's clinical judgment model to evaluate clinical judgment and reasoning skills of

nursing student in high-fidelity simulation. The study was qualitative in nature where

each student was interviewed individually after viewing the video of their performance

using a debriefing script tailored to the individual performances. The five themes that

emerged from this study were: (a) thinking like a nurse; (b) assessment depth; (c) looking

for answers to patient problem; (d) communication between healthcare team using SBAR

(Situation, Background, Assessment, and Recommendation), and (e) magical or reflective

thinking. Ashley and Stamp (2014) concluded that novice nursing students would benefit

from a pre-simulation conference to help in them think like a nurse. A pre-simulation

conference would allow for students to learn pertinent information concerning a

condition that could be applied in the reasoning process.

Bussard (2015) used the clinical judgment model as the framework for her

qualitative, interpretive study on the evaluation of the development of clinical judgment

in prelicensure nursing students through the use of reflection journals. Students went

through four high fidelity simulation scenarios and provided reflection journals with each

scenario. The Lasater clinical judgment rubric (LCJR) was used to evaluate the journal

entries as beginning, developing, accomplished, and exemplary. The LCJR is based on

the four aspects of the clinical judgment model. Bussard (2015) concluded that reflective

journaling is an effective teaching-learning strategy for prelicensure nursing students in the development of clinical judgment. Other studies support the use of reflection or reflective journaling as an effective educational strategy for the development of clinical reasoning (Jessee & Tanner, 2016; Monagle et al., 2018).

Jessee and Tanner (2016) used a quantitative approach in the development of a clinical coaching tool that used ono-on-one teaching, verbal questioning, and feedback behaviors to improve clinical reasoning in nursing students. Tanner's clinical judgment model was used as the framework for the study. The significance of the study was the tool, clinical coaching interactions inventory (CCII) advanced the measurement of clinical coaching from qualitative to quantitative. The teaching-questioning dimension were based on common clinical teaching strategies. The question examples followed Bloom's taxonomy and included remembering, understanding, analyzing, evaluating or creating, along with reflective questions. While clinical coaching development was the goal of this study, the use of questioning by the clinical coach was a desired component of clinical coaching. The questions increased in complexity based on Bloom's Taxonomy, forcing a higher level of thinking. While this was not the focus of the study, it is relevant to my study.

Monagle, Lasater, Stoyles, and Dieckmann (2018) used Tanner's clinical judgment model as the framework of their study to determine if structured reflection exercises would produce a more practice-ready new graduate nurse. The study utilized a mixed method approach, quantitative and qualitative. Three tools were used to evaluate clinical judgment; the health sciences reasoning test, the clinical workplace learning

culture survey (validity of tool has yet to be determined), and the Lasater clinical

judgment rubric. The Lasater clinical judgment rubric is closely aligned with Tanner's

clinical judgment model.

The LCJR has been used to provide feedback to students as they self-evaluate and

reflect on simulation and clinical experiences (Lasater, 2011). The rubric is based on the

four aspects of Tanner's clinical judgment model: noticing, interpreting, responding, and

reflecting. Lasater (2011) posited that for effective noticing to take place, there must be a

focused observation, a recognition of any deviations from expected normal, and the

ability to recognize any additional information needed. The rubric emphasizes effective

interpreting as the involvement of making sense of the data and prioritizing data (Lasater,

2011). Effective responding involves a calm and confident manner of approach, the

exhibition of clear communication, a well-planned intervention that leaves room for

flexibility, and being skilled in nursing (Lasater, 2011). The last aspect of Tanner's

clinical judgment model is reflection. The rubric identifies two areas of involvement,

self-analysis/evaluation and a commitment to improvement (Lasater, 2011). The rubric

evaluates each component on a four-point scale, with four being exemplary, three,

accomplished, two developing, and one beginning. This instrument will be used to scale

students' performance in a simulation, first as the students' initial evaluation and

secondly with guided questioning to help students deepen their understanding and

increase their clinical reasoning skills. The goal of the rubric is to help nursing students

think like a nurse.

Tanner's clinical judgment model was chosen for this study due to the clarity and ease of use of the model. I chose the LCJR as my measurement tool due to its alignment with Tanner's clinical judgment model. This theory aligns well with the research topic of the influence of questioning on the development of clinical reasoning in nursing students since clinical reasoning is the process used to make clinical judgments. The clinical judgment model through LCJR provides an opportunity to evaluate questioning on the development of clinical reasoning. Clinical reasoning is the process a nurse uses to make a clinical judgment. The four aspects or dimensions of noticing, interpreting, intervening, and reflection lends itself to evaluation of the process of clinical reasoning. Few studies discuss learning strategies for nursing educators to employ in the development of clinical reasoning. Most of the studies that are available, discuss reflective journaling as a learning strategy (Ashley & Stamp, 2014; Bussard, 2015; Monagle et al., 2018).

Literature Review Related to Key Variables and/or Concepts

This review provides a detailed summary of the literature regarding the influence of problem-based learning strategies, specifically questioning, on the development of clinical reasoning in undergraduate nursing students. The review includes studies related to learning strategies in the development clinical reasoning in nursing students. In addition, a section is provided to discuss the strengths and weaknesses of past research approaches. After providing a rationale for the selection of variables, the review of the literature is divided into three sections relative to the key variables of the study; clinical reasoning/clinical judgment, problem-based learning, and questioning/inquiry.

Related Studies: Interests and Methodologies

Patients' outcomes depend on nurses' abilities to reason clinically to make sound

clinical judgments (Dickson et al, 2018; Jessee, 2018; Tyo & McCurry, 2019). Parker,

Giles, Lantry, and McMillan (2014) posited that most new graduate nurses are not

practice ready, especially when it comes to clinical judgments. This leaves nurse

educators constantly looking for evidenced-based teaching/learning strategies to help

their students develop clinical reasoning. Parker, Giles, Lantry, and McMillan (2014)

posited the need to develop and test a range of evidenced-based strategies that will

empower nurses. In addition, these strategies can embed a systematic approach in nursing

graduates that will aid in their transition to practice. According to Parker et al., (2014)

new graduates are stressed by the expectations that they perform like a nurse with twenty

years of experience. Narrowing the education-practice gap will ease some of this stress

on new nursing graduates.

Determining the most effective strategies to develop clinical reasoning in nursing

education is key to successful transition into clinical practice and desired patient

outcomes (Kavanagh & Szweda, 2017). While researching teaching/learning strategies

that were most effective in facilitating clinical reasoning, I found the following

teaching/learning strategies that are effective in the development of clinical reasoning:

case studies and clinical scenarios, web-based case studies, case study or clinical scenario

with structured model or theory, clinical coaching, collaborative learning, concept

mapping, experiential or clinical practicum, reflective journaling, and simulation. Even

with this array of educational strategies available, new graduate nurses are still not

practice ready. More research is needed to develop and test additional educational strategies that can enhance clinical reasoning.

McMillian & Dwyer (1989) posited that problem-based learning (PBL) has been implemented as a learning strategy to promote clinical reasoning in many healthcare fields. Problem-based learning is a strategy developed in the late 1960s at the McMaster University Medical School in Hamilton, Ontario, Canada (Jones, 2008). This learning strategy utilizes active and self-directed learning to promote analytical reasoning, communication, and team problem-solving skills (Jones, 2008). Problems are the framework for discussions not lectures. Breytenbach, Ham-Baloyi, and Jordan (2017) identified PBL as a strategy that enhanced problem solving skills for real life problems. Few studies have investigated the effects of different problem-based learning strategies on clinical reasoning (Harmon & Thompson, 2015; Jessee & Tanner, 2016; Prosser & Sze, 2014). Merisier, Larue, and Boyer (2018) posited that most of the studies concerning PBL strategies involve their influence on critical thinking in nursing. Carvalho, et al. (2017) identified PBL as the most commonly utilized teaching intervention for critical thinking. With the focus in nursing shifting from critical thinking to clinical reasoning, studies need to change their focus to clinical reasoning.

Wosinski, Belcher, Dürrenberger, Allin, Stormacq, and Gerson (2018) posited that the goal of PBL is to improve clinical reasoning skills. Wosinski et al. (2018) noted a lack of studies concerning individual learning strategies to help nursing students master PBL, leaving an opening for future research. This study used a meta-synthesis approach. Questioning is one of the most frequently used PBL strategies in raising a student's

cognitive ability (Gilkison, 2003). Merisier, Larue, and Boyer (2018) reasoned that questioning, as a PBL teaching strategy, would influence clinical decision making. While it appears that the use of questioning influences clinical reasoning, there is no empirical evidence to support the assumption (Merisier et al., 2018). Providing nurse educators with evidenced-based teaching/learning strategies effective in the development of clinical reasoning and judgment, will help future nurses provide safe, quality care. I propose to study the influence of questioning on the development of clinical reasoning using Lasater's clinical judgment rubric as an instrument of measurement (Lasater, 2011).

Wuryanto, Rahayu, Emilia, Harsono, and Octavia (2017) presented a study on an outcome present test-peer learning (OPT-peer learning) model to develop clinical reasoning in nursing students who specialize in ICU. This study was qualitative in nature and emphasized a phenomenology approach. This learning strategy is based on Bandura's learning theory of self-efficacy. Bandura's learning theory envisions that one's ability to solve problems increases when they see interventions bring about desired outcomes (Wuryanto et al., 2017). The learning strategy used is a peer learning strategy that uses group problem solving and reflection. The strategy incorporates a reversal way of thinking to change the client from the current state to the desired state.

Strengths and Weaknesses of Past Research Approaches

The greatest strength of the Breytenbach et al. (2017) integrative review was the inclusiveness of teaching strategies available for nurse educators. Breytenbach et al., (2017) supported that nurse educators should use a variety of teaching strategies and that

educators be properly trained in their use. It was suggested that additional research be done on identifying which combinations of strategies would be beneficial.

The greatest strength of the Carvalho et al. (2017) study was the descriptions of the critical thinking and clinical reasoning strategies identified. Also. the steps in the clinical reasoning process are well defined See Figure 2.

Figure 2

Thinking Process
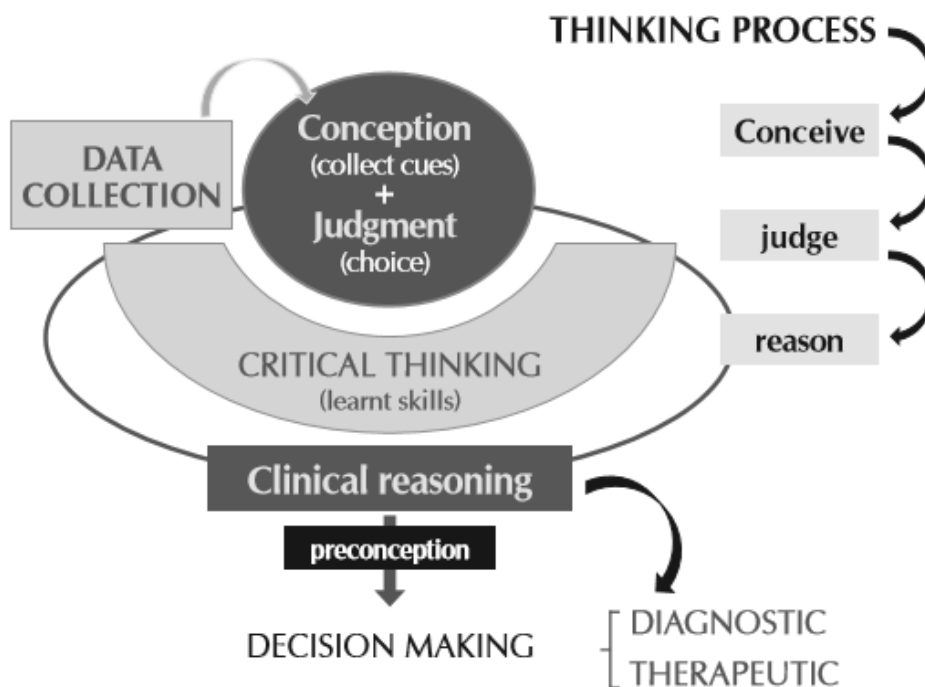
The Wosinski et al. (2018) study was unable to fully support the objectives of identifying and synthesizing the perspectives of undergraduate nursing students concerning strategies to assist with their success in PBL due to the lack of evidence on specific learning strategies. Another study, the Wuryanto et al., study identified some critical limitations. First, the clinical faculty did not provide optimal guidance. In

addition, the student-patient ratio was not consistent. The strength of the study was that they identified that PBL aided nursing students in the acquisition of skills that foster clinical reasoning. Strengths of the Wuryanto et al. (2017) study were also identified. The OPT-peer learning model was effective as a clinical reasoning learning strategy.

Benner, Sutphen, Leonard, and Day (2010) called for a radical transformation in the education of nurses. They believed that nursing education should bring effective teaching strategies such as experiential learning and coaching into the classroom. Benner et al. (2010, p. 82-86) identified four essential shifts for integration:

- Shift from a focus on covering decontextualized knowledge to an emphasis on teaching for a sense of salience, situational cognition, and action in particular situations,

- Shift from a sharp separation of clinical and classroom teaching to integration of classroom and clinical teaching,

- Shift from an emphasis on critical thinking to an emphasis on clinical reasoning and multiple ways of thinking that include critical thinking, and

- Shift from an emphasis on socialization and role taking to an emphasis on formation.

Learning to think like a nurse involves more than just focusing on contextual knowledge. Nursing students need to grasp an understanding of the situation, what is important and what is not. To achieve this, nursing students must learn to quickly assess and identify relative cues to the situation (Benner, et al., 2010). For example, a patient may exhibit a decrease in urine output and an increase in heart rate. Together, these cues

should trigger a nurse to explore for other manifestation of shock. The integration of clinical situations into the classroom is imperative for nursing students to build a sense of confidence as conditions change in the clinical settings.

The need to shift from critical thinking to clinical reasoning becomes more evident as patients present with increasingly complex situations. Benner et al. (2010) posited that critical thinking has become such a catch-all phrase in nursing in the pursuit of sound clinical judgments. While critical thinking is an important component to assist the nurse in clinical judgments, it is not all that is needed to make sound clinical judgments. Nursing students use a variety of forms of thinking; critical, creative, scientific, and formal empirical thinking to make clinical judgments. The also use clinical reasoning and clinical imagination to make decisions. This shift in nursing education allows graduate nurses to take into account the what-if questions by using creative, critical, scientific, and critical thinking to make sound clinical decisions. Benner et al. (2010) described clinical reasoning as the ability to reason with changes in clinical situations, all while taking into account the context and any concerns from the patient and/or family. Benner et al. (2010) believed that formation is critical in role development. Formation is the method by which someone is "made capable of functioning in a particular role" (Benner et al., 2010). My interest is the development of clinical reasoning in nursing students.

Rationale for Selection of Variables

Sedgwick, Grigg, and Dersch (2014) posited that the problem with nursing education is a matter of instilling the basic elements of reasoning into the daily activities of instruction leaving new graduates less than practice ready. Wolff, Pesut, and Regan

(2010) defined practice ready as "new graduates who are able to make the transition from student to professional nurse." Current acute healthcare environments are complex requiring nurses to possess sound clinical reasoning skills that allows them to recognize salient cues that suggest a decline in patient condition (Jessee, 2018). Patients' outcomes depend on nurses' abilities to reason clinically to make sound clinical judgments (Dickson et al, 2018; Jessee, 2018; Tyo & McCurry, 2019). A gap in the literature exists identifying current educational strategies that are effective in clinical reasoning (Merisier et al., 2018; Tyo & McCurry, 2019). Levett-Jones et al. (2010) posited that current teaching and learning strategies may fall short in the development of clinical reasoning skills.

Problem-based teaching/learning strategies have been shown to promote clinical reasoning in healthcare (Barrows and Tamblyn, 1980; Barrows, 1986: Merisier et al., 2018). This teaching/learning strategy utilizes active and self-directed learning to promote analytical reasoning, communication, and team problem-solving skills (Jones, 2008). In PBL, the clinical problems solved by the students are the basis for learning rather than lectures presented by the instructors. Breytenbach, Ham-Baloyi, and Jordan (2017) identified PBL as a strategy that enhanced problem solving skills for real life problems. Few studies have investigated the effects of different problem-based teaching/learning strategies on clinical reasoning (Breytenbach, Ham-Baloyi, & Jordan, 2017). Merisier, Larue, and Boyer (2018) posited that most of the studies concerning PBL strategies involve their influence on critical thinking in nursing. Carvalho, et al. (2017) posited that PBL is the most commonly used teaching intervention in the

development of critical thinking. Rakhudu, Davhana-Maselesele, and Useh (2016) describe PBL as one of the most innovative educational strategies used in health sciences education. Prosser and Sze (2014) concluded that programs that used PBL outperformed traditional programs in the application of skills and clinical reasoning.

In an early study Larue (2008) posited that the development of clinical reasoning was dependent on the educational strategies used in its development. Larue (2008) observed that nursing students used memorization strategies similar to Barrows' findings of medical students (Barrows, 1986). Memorization of facts provided superficial understanding and was not transferable as patient conditions changed. Barrows brought problem-based learning into healthcare education to deepen understanding and to develop clinical reasoning in medical students. Tamblyn was responsible to transitioning problem-based learning to nursing education (Barrows & Tamblyn, 1980).

Questioning is one of the most frequently used problem-based learning strategies (Merisier et al., 2018). Questioning as a teaching/learning strategy has been linked to critical thinking. However, Merisier et al. (2018) could find little empirical evidence linking questioning to clinical reasoning. I also was unable to find any studies that linked questioning as an effective strategy in the development of clinical reasoning. Questioning has been linked to critical thinking but not to clinical reasoning (Browne & Keeley, 1990; Merisier et al., 2018; Sellappah, Hussey, Blackmore, & McMurray, 1998).

Clinical Reasoning/Clinical Judgment

Clinical reasoning is the basis of every decision in nursing (Merisier, Larue, and Boyer, 2018). Tyo and McCurry (2019) explained that the literature does not agree on

just one definition of clinical reasoning. The fact that clinical reasoning is a complex

decision-making process that involves knowledge specific to the discipline, several

methods of thinking, and reasoning skills is agreed upon by most (Tyo & McCurry,

2019). Vallente (2016) describes clinical reasoning as a thought process used by

healthcare professionals where they gather and analyze patient information or cues,

determine the relevance of the information, and look for potential interventions that could

improve the patient outcomes. Levett-Jones, Hoffman, Dempsey, Jeong, Noble, Norton,

Roche, and Hickey (2010) define clinical reasoning as "the process by which nurses

collect cues, process information, come to an understanding of a patient problem or

situation, plan and implement interventions, evaluate outcomes, and reflect on a learn

from the process." A cue is a piece of patient data that is either objective or subjective

that requires a healthcare professional to make inferences to the situation or problem.

Nurses who do not possess clinical reasoning skills are likely to make poor

clinical judgments while nurses with good clinical reasoning skills are likely to have a

positive impact on patient outcomes (Tyo & McCurry, 2019). Sedgwick and Dersch

(2014) found that novice nurses are more likely to make decisions using a linear process.

With this process, tacit dimensions of the problems are not considered. This presents with

a much slower reasoning process as nurses work through complex patient problems.

Failure to recognize cues or changes in condition in a timely manner can lead to a

worsening condition.

Clinical reasoning skills are built over time with experience and knowledge

integrated with self-awareness, social, psychosocial, cultural, and contextual influences

(Sedgwick & Dersch, 2014). Development of clinical reasoning cannot wait until after graduation. A strong focus on clinical reasoning in nursing education is essential in the preparation of new graduates as they enter clinical practice (Institute of Medicine, 2010; Kavanagh & Szweda, 2017).

Consideration of several factors including self, patient and situation are required for skilled clinical reasoning. Nurses who possess self-awareness are more likely to see the need to think more broadly and deeply. They are able to prioritize interventions and ask relevant questions within the current context. They are also more likely to revisit answers to those questions to increase their experiential knowledge (Herron, 2017). This allows for better decision making when evidence is present (Sedgwick & Dersch, 2014). Understanding the full context of the patient's situation is crucial. Taking into consideration a patient's overall health, resilience, and support can impact clinical decisional making. The situation can include the timing or acuteness of the problem along with the environment in which the situation occurs

Many nurse educators teach how they were taught using a curriculum saturated with content (Kavanagh & Szweda, 2017). Most nurse educators also evaluate student nurses' thinking processes based-on the nursing process (Gonzalez, 2018). Clinical reasoning and the nursing process are not equal. The nursing process is liner in thought and fails to capture more complex clinical reasoning concepts (Gonzalez, 2018). The nursing process, while linear, does require critical thinking in the planning of care. Nursing process does not allow for more complex thought process needed for clinical reasoning such as analysis, intuition, and narrative thinking (Tanner, 2006). Gonzalez

(2018) described the framework of Tanner's Clinical Judgment Model and the Lasater

Clinical Judgment Rubric as ideal for teaching clinical reasoning due to the insight into

how nurses think when making clinical judgments and the development of that thinking.

Gonzalez (2018) used a concept-based approach to develop clinical reasoning in

the clinical setting. Each week a different theme was presented, along with clinical

lessons, learning opportunities, and activities. The clinical lessons demonstrated how

nurses use clinical reasoning throughout their shift. The lessons showcased the cognitive

process used by nurses and then allowed opportunities for students to practice in the

healthcare setting. Concept-based teaching helps to show common threads that students

can piece together, breaking clinical reasoning into smaller, more manageable pieces of

information (Gonzalez, 2018).

Assessing clinical judgment and clinical reasoning is a priority among nurse

educators (Dickson, Haerling, & Lasater, 2018). The National Council of State Boards of

Nursing Clinical Judgment Model (NCSBN-CJM) was developed to assist in the

development of tools for assessing clinical judgment by nurse educators (Dickson et al.,

2018). The NCSBN-CJM is a multi-layered model that include observation, cognitive

operations, and contextual factors (Dickson et al., 2018). By defining the specific layer of

the model, nurse educators can evaluate student clinical judgment abilities with

observable identified actions.

Harmon and Thompson (2015) studied the use of collaborative activities as a

teaching strategy for improving clinical reasoning in nursing students. Harmon and

Thompson (2015) used a quasi-experimental one-group time-series design for their study.

The OPT model was used as the data collection tool. It was noted that while collaboration improved scores in clinical reasoning, the overall scores were low, indicating low clinical reasoning skills (Harmon & Thompson, 2015). Some cited possible reasons for the overall low scores were incomplete data due to some students missing time, incomplete worksheets due to misunderstanding on proper procedure for completing the OPT worksheet, and students' inexperience with group learning. Limitation of the study were the small sample group and a time frame of eight weeks may not be adequate to demonstrate improvement in clinical reasoning.

Clinical reasoning develops over time. A novice thinker does best with well-defined tasks where analysis is usually a rule-based process (Jessee, 2018). The novice thinker has difficulty identifying subtle changes in patient conditions when they fall out of an expected frame of reference. Over time the nurse becomes an expert reasoner, shifting patterns of thinking. This shift may be anywhere along the continuum between intuition to analytic, taking into account depth of knowledge and experience.

Problem-Based Learning

PBL is an active teaching strategy that is student-centered where students use their knowledge and skills to solve ill-structured problems (Barrows, 2000). Barrows and Tamblyn (1980) posited that students learn through solving problems and using reflections of past experiences. Barrows (1986) believed that instructors should guide students in their learning but that students should take responsibility for their own learning. Barrows first used PBL at McMaster University as a way to improve clinical reasoning in medical students. His premise was that physicians had difficulty transferring

knowledge learned in medical school to the variety of problems they saw in practice. Through PBL, medical students were able to take current knowledge and past experiences to solve problems that could not be solve with a simple algorithm (Barrows, 2000). Students were required to look at alternatives and support the reasoning for their selections. He noted key objectives and characteristics of PBL that were different than traditional teaching methods (see Figure 3). Seeing the usefulness of this approach Tamblyn, a professor in nursing, introduced problem-based learning to other healthcare disciplines, including nursing (Barrows & Tamblyn, 1980).

Figure 3

Objectives and Key Characteristics of PBL

Objectives	Key Characteristics
- Structuring knowledge for use in clinical contexts - Developing an effective clinical reasoning - Developing effective self-directed learning skills - Increasing motivation for learning	- Learning is student-centered - Learning occurs in small groups - Teachers are facilitators or guides - Problems used as the organizing focus and stimulus for learning - Problems are a vehicle for the development of clinical problem-solving skills - New information is acquired through self-directed learning

Note. Key objectives and characteristics of problem-based learning. Adopted from "A problem-based learning in medicine and beyond: A brief overview" by H. S. Barrows, (1996, 5-6), New Directions for Teaching and Learning.

Much like the medical students in Barrow's study, PBL can help nursing students use their knowledge and problem-solving skills to overcome barriers in clinical practice. Nurses are continuously challenged with complex patient problems. Like Barrows' ill-

structured problems, these problems or changes in conditions are not always solvable with a simple algorithm. They require the nurse to tap into their knowledge and previous experiences to present possible solutions or alternatives to the problem. By the late 1990s, many nursing programs had added PBL teaching methodologies to their curricula to help develop clinical reasoning, self-evaluation, collaboration, and communication skills (Shin and Kim, 2013). In a meta-analysis of 22 articles on PBL in nursing students, Shin and Kim (2013) found that PBL in nursing education showed that PBL had a positive effect on clinical education of nurses in the development of their clinical reasoning skills. Other studies have shown a positive effect of PBL in nursing education (Jones, 2008; Prosser & Sze, 2014; Sanestani & Khatiban, 2013). Prosser and Sze (2014) found PBL courses to be beneficial due to the long-term retention of course content. These courses also allowed for short-term retention that involved elaboration of information, new skills, and clinical reasoning.

PBL uses a deep approach to learning by focusing on longer-term retention, understanding, and even the application of new knowledge. This is in contrast to a surface approach to learning where students' learning focuses on the short-term outcome such as studying for an exam. Prosser and Sze (2014) posited that if the focus of learning was to pass and examination, then the surface method of learning was appropriate. However, if the focus of learning was for long-term retention and application in a clinical setting, the deep approach to learning was preferred by students and educators.

Students have more control over their learning with PBL than with the traditional teacher centered approach. Students can determine what they need to learn as many bring

knowledge from varied experiences. PBL is usually carried out in small group discussions using collaboration with each other to explore alternatives in problem solving (Rakhudu, Davhana-Maselesele, & Useh, 2016). Educational institutions can also collaborate with clinical partners in the education and development of clinical reasoning in students. The common goal of this collaboration is the development of practice ready nurses upon graduation of the nursing program.

Questioning/Inquiry

Merisier, Larue, and Boyer (2018) noted questioning to be one of the oldest used strategies in the development of student reasoning dating back to the early Greek philosopher Socrates. Questioning has been studied for it effect on critical thinking but not on its effect of clinical reasoning. Critical thinking is a general thinking process while clinical reasoning is a process that incorporates all types of thinking to include critical thinking (Benner et al. 2010). Clinical reasoning is a thinking process that takes into account the clinical context while analyzing data. Clinical thinking is required by clinical reasoning, leading one to believe that questioning as an educational strategy should also affect clinical reasoning.

The concept of questioning is embedded in the clinical judgment model. In particular, questioning fits the model's first step of noticing. Debriefing post simulation is an evidenced-based strategy to increase clinical reasoning in nursing students (Ashley & Stamp, 2014). During debriefing, students typically describe their thoughts and feelings on a situation that just occurred. Learning to think like a nurse requires a variety of reasoning patterns, when working through a patient problem or situation, that may be a

combination of intuitive, analytical, and narrative input. For assessments to be effective, students must notice the cues presented by their patients. This noticing is the first step in Tanner's (2006) clinical judgment model. With debriefing, instructors can provide questions based on student performance to guide them into thinking like a nurse.

Reflection is another teaching/learning strategy used in the development of clinical reasoning and is the last step in Tanner's (2006) clinical judgment model. Students may reflect-in-action or reflect-on-action (Koharchik, Caputi, Robb, & Culleiton, 2016; Tanner, 2006). Reflection-in-action is the nurse's ability to interpret the patient's response to the intervention. Reflection-on-action as the subsequent thinking the nurse has about the situation and what they have learned from it. Reflection-in-action is one way an instructor can provide the student time to think about the activity and determine what they learned, correct their thinking if needed, and use what they learn in future situations (Koharchik, Caputi, Robb, & Culleiton, 2016). Reflection-on-action is typically a writing activity that where the student dissects the whole patient encounter with the intent of increasing knowledge and judgment (Koharchik, Caputi, Robb, & Culleiton, 2016).

While questioning is used in both debriefing and reflection, there are no studies on questioning as a teaching/learning strategy specifically in the development of clinical reasoning. Most studies that assess questioning are related to critical thinking (Gilkison, 2003; Gul et al., 2014; Phillips et al, 2017). Gilkison's (2003) study was the most closely related study to my proposed research. Gilkison used questions by tutors to elevate the cognitive level of discussions within the tutoring groups. These studies found that clinical

educators were more likely to use lower cognitive level questions than higher cognitive questions.

Summary and Conclusions

The major themes of this study are clinical reasoning, PBL and questioning. Clinical reasoning is the process nurses use to make clinical judgments. This process includes a variety of ways of thinking. Tanner (2006) described these processes in the first three steps of her clinical judgment model as noticing, interpreting, responding, and reflecting. PBL is a strategy that is student-centered requiring students use their knowledge and skills to solve ill-structured problems (Barrows, 2000). Questioning is a teaching/learning strategy designed to stimulate a deeper, higher level of cognitive learning.

Patients' outcomes depend on nurses' abilities to reason clinically and to make sound clinical judgments (Dickson et al., 2018; Jessee, 2018; Tyo & McCurry, 2019). Teaching nursing student to reason clinically will allow them to make better clinical judgments, closing the gap from academia to practice. Looking at teaching/learning strategies that help develop clinical reasoning, I found the following: case studies and clinical scenarios, web-based case studies, case study with a structured model or theory, clinical coaching, collaborative learning, concept mapping, experiential or clinical practicum, reflective journaling, and simulation (Tyo & McCurry, 2019). I was unable to find any published studies that used questioning as a teaching/learning strategy in the development of clinical reasoning in nursing students.

PBL has been shown to improve clinical reasoning in other healthcare field such as medicine. Questioning was listed as one of the most frequently used PBL learning strategies. Thus, questioning should affect clinical reasoning in nursing students. However, I found few studies that directly link questioning to clinical reasoning. Clinical education uses questioning as a teaching/learning strategy but I found limited studies on the effect of questioning or inquiry on clinical reasoning. As an educator, I sought evidence on which to base my teaching/learning strategies. The few articles identified looked at either the level of questions being asked or related questioning to critical thinking rather than the efficacy of questioning on clinical reasoning.

Benner (2015) proposed that nursing education shift their way of thinking about pedagogies based on the Carnegie National Nursing Education Study in the United States. I will use the five shifts identified by Benner to guide my assessment of questioning in the development of clinical reasoning in nursing students. First, nursing education needs to shift from surface or superficial learning to deep learning. Second, academia needs to not only focus on the acquisition of knowledge, but also on how to use that knowledge in actual practice. Third, the emphasis must move from a focus on critical thinking to clinical reasoning with multiple ways of thinking. Fourth, teaching/learning must be student-centered with the student playing an active role in formation. The fifth and final shift is departing from teaching abstract formal theories and expecting students to apply them to a focus on inductive, conceptualized use of knowledge by having students analyze, synthesize, and evaluate information. These shifts are evident in the Lasater's clinical judgment rubric.

To help fill this gap of identifying educational strategies that are effective in the development of clinical reasoning skills, this study will utilize retrospective data obtained from a structured simulation with guided questioning that incorporated the shifts proposed by Benner for nursing education. To ensure that questioning as a teaching/learning strategy is the only potential reason for a change in clinical reasoning, retrospective data will be obtained from the pre-evaluation, introduction of questioning as a teaching/learning strategy, and data from a post evaluation. The results of this study will provide evidence as to the influence of questioning on clinical reasoning in prelicensure nursing students, extending the knowledge of nursing education teaching/learning strategies. In Chapter 3, I will outline the research methodology that guides this study.

Chapter 3: Research Method

Using the framework of Tanner's clinical judgment model, the purpose of this study was to explore the influence of questioning, a problem-based teaching/learning strategy, on the development of clinical reasoning in undergraduate nursing students. PBL is one of the most used learning strategies to foster clinical reasoning (Merisier et al., 2018). Larue (2008) posited that while PBL creates a learning environment for fostering the development of clinical reasoning skills, educational strategies used will determine the success of the outcomes. There was little in the literature on the effectiveness of different problem-based educational strategies in the development of clinical reasoning. This study was in response to the challenge made by Harmon and Thompson (2015) to nurse educators to develop and test teaching/learning strategies to foster the development of clinical reasoning in nursing students. The PBL strategy of questioning was selected to test its influence on clinical reasoning in nursing students since it is one of the more prominent PBL strategies.

In this chapter, I explain the methodology used in this study. The research design and rationale section covers the study variables, the research design selection and rationale, the research question, and the intervention. The methodology section covers all procedures used for the study that would enable another researcher to replicate the study. Components are the population, sample and sampling procedures, procedures for recruitment and data collection, and clear instructions for the use of the intervention of questioning. This chapter also describes the instrument used for the collection of the data, any threat to validity, and ethical procedures.

Quantitative Research Design and Rationale

The research question for this study was:

RQ-Quantitative: To what extent does the use of questioning, as a problem-based teaching/learning strategy, influence the development of clinical reasoning in undergraduate nursing students?

H_0: Questioning as a problem-based learning strategy has no influence on the development of clinical reasoning in undergraduate nursing students.

H_a: Questioning as a problem-based learning strategy influences the development of clinical reasoning in undergraduate nursing students.

A quantitative research design was selected as a means of testing the relationships among the variables (Creswell, 2014). The study investigated the relationship between the independent variable of "questioning" and the dependent variable of "clinical reasoning". A quasi-experimental one group ex post facto design was conducted using secondary data. The specific type of quantitative research method was analytical in nature using a pretest/posttest design (Forister & Blessing, 2016). I evaluated if the independent variable (questioning) influenced the dependent variable (clinical reasoning) and the extent to which the dependent variable was affected by the independent variable. The study used data from a simulation experience required by the college as part of the students' routine clinical experiences. Students participated in a simulation experience and were asked to complete a clinical judgment tool based on their experience. The students were then asked a series of open-ended questions to elicit a deeper thought process prior to repeating the simulation. After completion of the second simulation, the

students completed the clinical judgment tool a second time. The clinical judgment tool used for clinical evaluation was developed by the college based on the LCJR. The design choice of one group ex post facto was chosen as it matched the secondary data available to test the educational strategy of questioning.

The intervention for the study was a set of guided open-ended questions used to deepen the students thought processes (see Appendix 3). The set of guided questions was the independent variable for the study. The data was collected retrospectively, eliminating a potential time constraint that might exist due to the program's structuring of courses. There were no financial constraints identified except for the researcher's time.

Research is needed to advance knowledge in all disciplines including nursing. Cipriano (2007) described five ways of knowing to assist in understanding how knowledge is obtained: empirical knowing, ethical knowing, personal knowing, aesthetic knowing and synthesis of the other four types of knowing. Empirical knowing is based on facts obtained from quantitative research. The focus of ethical knowing is a person's moral values. Personal knowing focuses on relationships between people and knowing oneself. Perception with an emphasis on the uniqueness of relationships and interaction is the focus of aesthetic knowing. While all forms of knowing are importing when providing patient care, empirical knowledge is of utmost importance to the advancement of knowledge in the discipline. This study provided empirical evidence to the influence of questioning as an educational strategy on the development of clinical reasoning, strengthening the knowledge of the discipline.

Methodology

Descriptions of the population of interest, the type of sampling, sampling procedures, and procedures for recruitment are discussed in this methodology section. In addition, this section will explain the type of data collection, procedures for data analysis, the tool used to measure clinical reasoning and judgment in nursing students pre and postintervention of the teaching/learning strategy of questioning.

Population

The target population for this study was deidentified secondary data obtained from prelicensure nursing students school records. I assigned the same number to the pretest and posttest of each student to ensure comparison accuracy of the data collection process. Data was obtained from records of students who were enrolled in their last lower-level clinical course. The secondary data was obtained from a population of nursing students who were enrolled in a small community college in the southeastern United States between 2017 - 2019. The research examined the retrospective data from three cohorts in the same clinical course providing an oversampling size of approximately 100 students to ensure an adequate number of students have completed all the data on the tool. 42 students will be randomly selected from this sample to meet the sample size of 34 indicated by the power analysis. This was approximately a 20% increase in sample size, in the event of I ran across any tools with incomplete data. Only completed tools with a preintervention and postintervention evaluation were used.

Sampling and Sampling Procedures

Retrospective data obtained from records of nursing students enrolled in their last lower-level clinical course was used for the study. The records used in this retrospective study were taken from records of students who were required to participate in simulation experiences as a portion of their clinical experiences for this clinical course. Because retrospective deidentified data was used, student permission was not needed. However, permission for the use of the data was granted by the Director of Health Sciences and the Dean of Instruction from the community college. Inclusion criteria for participation in the current study were the records of nursing students in their first upper-level clinical course who completed both a pre-intervention and postintervention clinical judgment tool. Exclusion criteria for participation in the study included nursing students who failed to complete both a preintervention and a postintervention clinical judgment tool.

Power Analysis for effect size, alpha level, and power level

The online power analysis tool G* Power 3 (Faul et al., 2007) was used to calculate sample size for a test of means using two dependent groups of matched pairs. This type of paired sample is sometimes referred to a repeated measures design since the research design repeats the assessment on the same group (Grove, Burns, & Gray, 2013). Qualifiers of effect size of .50, a power = .80, and an alpha = .05 were used to calculate the sample size based on standard acceptable research values (Creswell, 2014; Monagle et al., 2018). The online power analysis tool G* Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) indicated that a sample size of 34 would allow for a positive medium sized effect between the pre and postintervention groups while assuming a power = .80,

and an alpha = .05. A sample pool of approximately 100 was used to ensure that an ample sample size of completed data is obtained.

Procedures for Recruitment, Participation, and Data Collection

A request to use 2017 - 2019 retrospective data from a simulation experience incorporated into the curriculum was approved by the Director of Health Sciences and the Dean of Instruction. For recruitment for the study to be a possibility, approval from the Institutional Review Board (IRB) was obtained from Walden University and the community college. Demographic data obtained included age and gender. The evaluation tool contained no identifiers beyond a number and the demographic information needed for the study. No informed consent was required due to the use of retrospective data.

The data collected was from a single simulation in the clinical course repeated throughout the semester for three consecutive years. The students were scheduled for an eight-hour simulation experience as part of their required clinical experience. All students arrived at the simulation where a pre-briefing of the scenario occurred that included the objectives of the simulation. The students participated in the simulation activity and were requested to complete the clinical judgment tool (Appendix A) based on Tanner's clinical judgment model and Lasater's clinical judgment rubric (Appendix B). Next, the students were asked a series of guided questions to encourage discussion and deeper thinking (Appendix C). The students repeated the simulation and were then asked to redo the clinical judgment tool. All information entered by the students used in the analysis was scored using the Lasater clinical judgment rubric.

The simulation consisted of four nursing students per simulation group. After the simulation, the students completed the clinical judgment tool. The instructor then asked a series of guided, open-ended questions to stimulate deeper thought process prior to repeating the simulation. The students then completed the clinical judgment tool for a second time. The simulation was repeated over the course of the semester until all students in the course completed the simulation. Each student was required to sign a confidentiality statement concerning simulation. Secondary data from the clinical judgment tools was evaluated retrospectively using the Lasater clinical judgment rubric. Lasater's clinical judgment rubric has 11 components for measurement. Each component will be scored based on the rubric's levels using the following numerical values: one point for beginning, two points for developing, three points for accomplished, and four points for exemplary. Each student's pre and postintervention tools were given a score and compared to determine if the educational strategy of questioning influenced the development of clinical reasoning. Intrarater repeatability will be performed to ensure consistency in scoring (Ergai, et al., 2016; Kaur, et al., 2014).

Instrumentation and Operational Constructs

Lasater clinical judgment rubric

The instrument used to evaluate the secondary data was the LCJR developed and published in 2007 (Lasater, 2007). The tool was designed to evaluate clinical judgment in nursing students based on the framework of Tanner's clinical judgment model (2006). The rubric describes levels of performance in clinical judgment. The tool is appropriate for the evaluation of clinical reasoning as clinical reasoning is the thought process that

nurses and other health care clinicians make their clinical judgments. The first three

components of Tanner's clinical judgment model, noticing, interpreting, and responding,

are all part of the thought processed used to make clinical judgments. The last component

of reflecting aids in the evaluation of the thought processes used in the clinical judgment

and allows the nurse to gain a knowledge of what has occurred as a result of the nursing

actions. Tanner's clinical judgment model demonstrates a variety of reasoning processes

from analytical to intuitive (Lasater, 2007).

Lasater's clinical judgment rubric identifies two to four dimensions per

component of Tanner's clinical judgment model for a total of 11 dimensions. There are

performance indicators for each dimension, identifying four levels of development

(beginning, 1 point; developing, 2 points; accomplished, 3 points, and exemplary, 4

points) for a possible score range of 11 to 44. The rubric helps identify gaps in student's

understanding which may have gone unnoticed. This allows for instructors to offer timely

and meaningful feedback. The rubric was developed to describe the development of

clinical judgment and was pilot tested in a simulation laboratory.

The reliability and validity of the tool was established in the Adamson study in

2011, the Gubrud-Howe study in 2008, and the Sideras study in 2007. The population for

each study was undergraduate nursing students. The Sideras study compensated for the

fact that the indicators were highly intercorrelated. Thus, the level of agreement was

expanded to one point, meaning that rates that varied by one point or less were

considered equal. The reliability percent varied over time and between pairs. At round

four, the percent of agreement ranged from $r = 0.75$ to 1.0. At round eight, the percent of

agreement ranged from $r = 0.91$ to 1.0. At round 13, the percent of agreement ranged

from $r = 0.85$ to 0.57. The validity results from the Sideras study showed sizable

differences between the two groups but supported the ability of the raters to evaluate the

clinical judgments using the LCJR. The Sideras study used the tool to evaluate the

differences in clinical judgment between junior and senior nursing students using three

simulation case scenarios.

The Gubrud-Howe study (2008) used only two raters and each rater received

training prior to rating using the LCJR. The interrater reliability indicated a mean score of

92% agreement between the raters. A one-way ANOVA was conducted to assess for any

significant differences in the raters with the following results: F ratios for all indicators

<4.84 with p values all >0.05. The Gubrud-Howe study used the instrument to understand

clinical judgment as instructional strategies were being developed for high-fidelity

simulation.

In the Adamson study, the raters also received training and the rater selection was

based on strict criteria. The interrater reliability results demonstrated a 95% confidence

interval. This study also measured validity demonstrating that the scores were consistent

with the intended levels. The Adamson study was used for assessing the reliability of

simulation evaluation instruments. I was the only evaluator of the clinical judgment tools

negating the concern of interrater reliability. I tested the results of the data for internal

consistency reliability using Cronbach's alpha and compare that to published reliability

data.

Clinical Judgment Tool

The clinical judgment tool was compiled by the community college using the 11 dimensions of the LCJR (Lasater, 2011). The clinical judgment tool was devised as a way for the students to organize their thought processes as they made their clinical judgments (Appendix A). It provided a way for the faculty to evaluate their reasoning and to correct any errors in reasoning in both clinical and simulation settings. This evaluation has been subjective by the clinical and simulation faculty. Although this tool has not been evaluated against the Lasater clinical judgment rubric by the community college it was developed to specifically correlate to the Lasater clinical judgment rubric. After the initial completion of the clinical judgment tool

additional open-ended questions were asked by the simulation faculty to encourage a deeper thought process (Appendix C). The students were then asked to redo their clinical judgment tool to include the additional questions.

Data Analysis Plan

Descriptive statistics and paired samples *t* test were used to compare the mean differences between the preintervention and the postintervention group using the Statistical Package for Social Sciences (SPSS), version 24 (I.B.M., 2016). There was an assumption that there will be a normal distribution of the differences in the data for the paired *t* test (Pandis, 2015). I provided a histogram to check for normal distribution. The confidence interval was run with the default of 95%. Data that can be obtained from running this paired samples *t* test included general statistics of mean, sample size, standard deviation, standard error, and correlation between the two variables. The paired

samples *t* test was used to determine if there is a statistically significant difference between the two variables. I tested internal consistency reliability using Cronbach's alpha for the LCJR.

Threats to Validity

Valid findings are needed to allow for the acceptance or rejection of the null hypothesis. Threats to validity could raise questions on the usefulness and appropriateness of the data collected and the conclusion made by the researcher (Creswell, 2014: Forister & Blessing, 2016; Nieswiadomy & Baily, 2018). This section will discuss threats to external, internal, construct, and statistical conclusion validity. The importance of mitigating threats to validity cannot be over emphasized (Ampatzoglou et al.,2019).

Threats to External Validity

Creswell (2014) describes issues that arise when incorrect inferences are drawn from research findings to other persons, settings, and or past or future situations as threats to external validity. These threats could affect the ability to generalize the results of a study questioning if this study will be relevant to others (Ampatzoglou et al., 2019). External threats to validity are often placed in two categories: those related to the populations used and those related to the environment in which the study takes place.

Caution was used when generalizing findings from a population sample in a single setting to the whole population. This study used a sample of prelicensure nursing students in a small community college in the southeastern United States. This sample may not be representative of the population of prelicensure nursing students in other

geographical regions or in programs for diploma, associate degree, and baccalaureate

nursing programs. The results of this study may not be generalizable to other populations

of prelicensure nursing students but will allow for a generalization to a smaller

population of prelicensure nursing students in associate degree programs.

Recommendations to replicate the study in a variety of settings was suggested. However,

the results may add to the existing body of knowledge of evidenced-based educational

strategies for the development of clinical reasoning.

Environmental or experiment-related threats to external validity may make it

difficult to replicate the study. Clear descriptions of variables and protocols with

adequate detail can help to alleviate experiment-related threats (Ampatzoglou et al.,

2019). Multiple interventions can cloud the effect of the intervention that is being

measured. By ensuring that only one intervention was used between the measurements

helped alleviate this external threat to validity. While I was using secondary data, I am

assured that only one intervention occurred between the pre and post measurements.

Other threats to external validity can include a Hawthorne effect where subjects know

they are being studied and can skew the results (Forister & Blessing, 2016). The use of

secondary data that has not been analyzed will allow for unbiased subjects. Another

potential threat to external validity can be cause by the involvement of the researcher in

the study. This is referred to the Rosenthal effect (Forister & Blessing, 2016). The use of

secondary data prevents any personal traits from the researcher affecting the study

results.

Threats to Internal Validity

Threats to internal validity are described as unintended factors or conditions that could affect the results (Forister & Blessing, 2016). Internal validity verifies that the study measures what it is intended to measure and that there is enough data to support the conclusions (Ampatzoglou et al., 2019). There are several factors or conditions that could threaten internal validity. Creswell (2014) identifies internal threats to validity as instruments, procedures, treatments, or participant experiences that have the potential to cause an incorrect interpretation of the results in regards to the population of the study.

A potential internal threat to validity is a change in the instrument, pretest and posttest, impacting outcome scores. The use of the same instrument (Lasater's clinical judgment rubric) supported the study outcomes. Time can threaten the internal validity of a study due to maturation, history, or attrition. All students in the simulation completed the pre and postintervention evaluations. The timing of the pretest and posttest occurred in the same day, minimizing the experimental mortality or attrition where participants dropout of the study (Creswell, 2014; Forister & Blessing, 2016). However, the pre and post assessments being on the same day, I was unable to conclude if the improvements in clinical reasoning was retained over time. For this study I will use a convenience sample of students enrolled in the last clinical lower-level course. The G* Power Analysis suggested a sample of 34 participants. The sample available is approximately 100 students. Forty-two students were selected (a 20% increase of suggested sample size) to ensure an adequate number of completed tools were available for evaluation. I checked with Center for Quality Control to see if a random sample from the available participants

would increase validity. A confidentiality agreement was required for all students participating in simulation experiences, minimizing any diffusion of intervention effect.

Threats to Construct or Statistical Validity

Construct validity looks at how effective the test or experiment was in measuring what was intended (Ampatzoglou et al., 2019). Was the measurement or method appropriate? The methodology involves a one group pre/post design that will effectively measure the effect of the intervention of questioning. The Lasater clinical judgment rubric supports the constructs necessary to measure the processes used in clinical judgment or clinical reasoning (cite this). The Lasater clinical judgment rubric is rooted in Tanner's clinical judgment model, leaving a broad enough measurement to support the development of clinical reasoning. The first three construct of Tanner's clinical judgment model looks at closely at the process of clinical reasoning. Specific open-ended questions were used to encourage a deeper type of thinking in each construct of the theory.

Creswell (2014) identifies threats to conclusion validity when researchers make inferences that are inaccurate based on the data due to insufficient statistical power or a violation with statistical assumptions. There will be a sufficient number of participants to achieve statistical power based on calculations from G* Power Analysis decreasing the risk of conclusion validity (Faul, Erdfelder, Lang, & Buchner, 2007). The data collected by the college was adequate to support the needed sample for this study.

Ampatzoglou et al. (2019) posited that conclusion validity refers to what degree the conclusions reached are representative of the data collected. This is usually the result

of researcher bias. The minimize this risk, the researcher will use the Lasater clinical judgment rubric for evaluating the participants' responses on the clinical judgment tool.

Ethical Procedures

Utmost care was taken to protect the rights of the participants by using deidentified secondary data. The study posed no risk to the participants who were part of the intervention when it was implemented and their data will not include names or identifiers that could place the students who participated in the original intervention at risk. Permission was obtained from the Walden University's IRB, as well as permission from the Director of Health Sciences and the Dean of Instruction of the community college prior to any data collection procedures being collected.

There was no need for informed consent since my study used retrospective data. The Lasater clinical judgment rubrics had no identifiers beyond descriptive data and a randomly assigned number. The study used a convenience sample of data from the records of students enrolled in their last lower-level clinical course. The records used for this retrospective study were taken from records of students who were required to participate in the simulation experience as a portion of their clinical experiences for the clinical course. Each student was given the same amount of time to complete the research instrument pre and postintervention. Since the study used retrospective data, the was no influence on the students' grade. All clinical judgment rubrics were scanned and will be kept with analysis of all data in a secure, password protected computer, in a personal location for five years.

Summary

Clinical reasoning is needed to make sound clinical judgements and obtain optimal patient outcomes. It is important to have empirical evidence on teaching/learning strategies that foster the development of clinical reasoning in prelicensure nursing students. The quasi-experimental, one group post ex facto design will explore a sample population of prelicensure nursing students to help provide evidence for the use of questioning as an effective educational strategy in the development of clinical reasoning.

Problem-based learning as a strategy to increase clinical reasoning is well supported in the research with a significant gap in the specific teaching/learning strategies for the development of clinical reasoning. Questioning is the most prominent problem-based learning strategy. This research study can enhance the current body of knowledge on educational strategies for the development of prelicensure nursing students. Chapter 3 provides a description of how the research will be conducted with Chapter 4 relating the data collection, description of the intervention, results of the data analysis, presentation of the statistical data obtained.

Chapter 4: Results

PBL is one of the most widely used learning methods to foster clinical reasoning. However, there are few studies that look at the specific learning strategies of PBL on the development of clinical reasoning. The purpose of the study was to investigate the influence of questioning as a PBL strategy on clinical reasoning in prelicensure nursing students. My research question and hypotheses were as follows.

RQ – Quantitative: To what extent does the use of questioning as a problem-based learning strategy influence the development of clinical reasoning in prelicensure nursing students?

H_0: Questioning as a problem-based learning strategy has no influence on the development of clinical reasoning in prelicensure nursing students.

H_a: Questioning as a problem-based learning strategy influences the development of clinical reasoning in prelicensure nursing students.

In this chapter, I discuss methods used for data collection. This includes the time frame for data collection as well as any discrepancies in the data from the plan presented in Chapter 3. Baseline descriptive data and demographic characteristics are discussed. This is a representative sample of a larger population as discussed in terms of external validity. Also presented are the results of the data followed by a summary.

Data Collection

Time Frame and Discrepancies

A request to use the 2017-2019 retrospective data from a simulation experience already incorporated in the curriculum was approved by the Director of Health Sciences

and the Dean of Instruction since the community college had no formal IRB. Approval

was also obtained from Walden University's IRB prior to recruitment. The college

provided the data as clinical judgment forms for both preintervention and

postintervention. The clinical judgment tools were evaluated using the LCJR. To verify

the consistency in my evaluation of the forms, I reevaluated the clinical judgment tools

using the LCJR after waiting 2 weeks from the initial evaluation. The results of the two

evaluations were exactly the same.

Descriptive and Demographic Characteristics of the Sample

The data were collected from a single simulation that was repeated in the clinical

course for 3 consecutive years. The period of time was selected to ensure an adequate

number of completed pre and postintervention clinical judgment tool sets were accessible

for analysis. Based on the G*Power calculation, a sample size of 34 was needed. I was

able to collect a total of 35 completed sets of clinical judgment tools for evaluation using

the LCJR.

This 8-hour simulation was part of the students' required clinical experiences for

the course. The clinical judgment forms allowed the students to demonstrate their clinical

judgment ability and development (Adamson, et al., 2012). The LCJR allowed for a

measurement of the demonstrated ability and development prior to the use of questioning

by the instructor and after the use of questioning. Demonstrated ability and development

was demonstrated by the improvement of the total clinical judgment scores based on the

LCJR. There were no discrepancies from the original plan identified in the data

collection.

The sample consisted of the records of three cohorts of prelicensure ADN nursing students enrolled between 2017 and 2019 in the clinical course. All students enrolled in the course were required to have completed a pre and a post simulation clinical judgment tool which was used for the analysis for this current study. The LCJR (pre and postintervention) used by each student was assigned unique identifier so that the pre and post tools were linked together by a single identifier. The dataset used for the sample for this study consisted of a total of 35 completed clinical judgement tool sets. The LCJR contained no identifiers beyond a number and the demographic information needed for the study.

Representativeness

The sample was obtained from the larger population of ADN students in a small community college in the southeastern United States. The sample included five males and 30 females as shown in Table 1. The sample may not be representative of the population of prelicensure nursing students in other geographical regions or in other types of nursing programs but allowed for a generalization to similar prelicensure nursing students in associate nursing programs in the southeastern United States. Students ranged in age from 21 years of age to 39 years of age with a mean age of 28.43 years of age.

Table 1

Demographic Information: Gender Formatting

	n	Percent
Male	5	14.3
Female	30	85.7
Total	35	100.0

Results

Statistical Assumptions

According to Grove, et al, 2013, results from the general population have a tendency to follow a normal distribution or a bell curve. However, testing for assumptions are important to assure the robustness of any parametric test including the paired t test. There are three assumptions for the paired *t* test (Forister & Blessing, 2016; Grove, et al, 2013). First, the two sets of data must be collected from the same group. The assumption was met as the two samples, pre and post, were paired with each participant providing a pre and a postscore. The difference between the group scores must then be tested to assure they follow a normal distribution and have no significant outliers (Grove, et al, 2013). I had to first compute the difference between the pre and postintervention scores to create a new variable for measurement. I used a histogram (see Figure 4) and frequency chart to view the distribution of the differences and saw no visible differences in normality or significant outliers in the difference scores between the two paired groups indicating that the assumptions were met.

Because the sample size was less than 50, I then examined the intervention LCJT difference score results for normality using the Shapiro-Wilks test to compare the difference between the scores in the sample population to normally distributed scores with the same mean and standard deviation (Fields, 2017). The Shapiro-Wilk test is used to test normality when the sample population is smaller than 50 (Ghasemi & Zahedias, 2012). The results of the Shapiro-Wilk test ($p = 0.105$) were not significant ($p < 0.05$) indicating that the paired t-test LCJT difference scores did not differ significantly from

the normal distribution (see Table 3). To further examine normality the distribution was examined to see how far the difference scores were from 0 so the distribution for kurtosis (-.448) and skewness (-.271) with neither result greater than ± 1.0 indicating little deviation from normality (Fields, 2017).

For the third and final assumption of the t test, the differences between the paired scores must be independent. Because each score represented the difference between the paired individual groups, the final assumption for the paired *t* test was therefore met.

Table 2

Tests of Normality

| | Shapiro-Wilk | | |
	Statistic	*df*	Sig.
Difference in LCJT Pre and Postintervention	.969	35	.416

Figure 4

Difference in Pre and Postintervention Scores
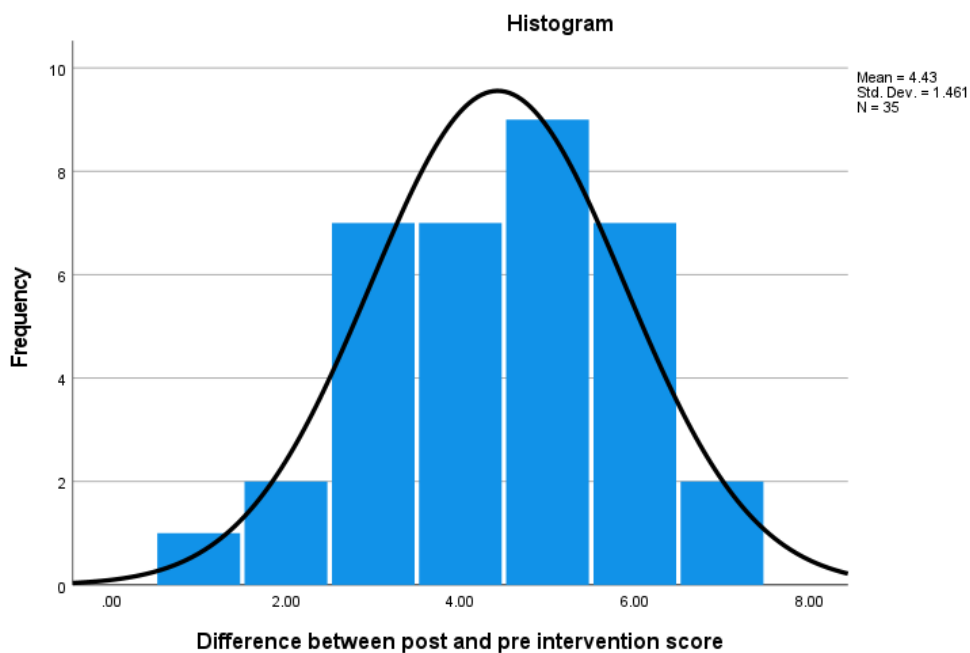
Statistical Analysis

The pre-intervention score was measured immediately before the intervention and the postintervention score was measured after the intervention and repeat of the simulation and because the tests for assumptions of the paired t test were conducted and all assumptions were confirmed as met, I proceeded with examining the results of the paired *t*- test.

The paired t test was used to compare the means for the preintervention score (*M* = 26.57, SD = 3.432) and postintervention score (*M* = 31.00, SD = 3.106; see Table 2). The 35 participants had an average difference from preintervention LCJT scores to postintervention LCJT score of 4.43 (SD = 3.106, 95% CI = [-3.817, -2.237], *p* <0.000),

indicating an increase in clinical reasoning. The correlation between the pre and

postintervention of questioning results was strong ($r = .905$, $p < .001$).

Table 3

Paired Samples Differences

	Mean	Std. Deviation	Std. Error Mean	95% CI of Difference		t	df	p
				Lower	Upper			
Total LCJT Score Postintervention -Total LCJT Score	4.429	1.461	.247	3.927	4.930	17.933	34	<.001

I further examined the instrument's internal consistency or reliability by running a

Cronbach's alpha (.836), indicating a strong internal reliability coefficient (Grove et al.,

2013). Internal consistency or reliability is usually stronger with instruments that have

over 20 or more items. Since this instrument has only 11 items it was important to look

at internal consistency or reliability.

Table 4

Clinical Judgment Scores Pre and Postintervention Paired Differences

		Mean	*SD*	Std. Error Mean	95% Confidence Interval of the Difference		*t*	*df*	Sig-two tailed
					Lower	Upper			
Pair 1	Focused observations – Focused observations postintervention	-.257	.443	.075	-.409	-.105	-3.431	34	.002
Pair 2	Recognizing deviations from expected patterns – recognizing deviation from expected patterns postintervention	-.486	.507	.086	-.660	-.312	-5.667	34	.000
Pair 3	Information seeking – Information seeking postintervention	-.714	.458	.077	-.872	-.557	-9.220	34	.000
Pair 4	Prioritizing data – Prioritizing data postintervention	-.457	.505	.085	-.631	-.284	-5.351	34	.000
Pair 5	Making sense of data – Making sense of data postintervention	-.514	.507	.086	-.688	-.340	-6.000	34	.000
Pair 6	Calm, confident manner – calm confident manner postintervention	-.171	.382	0.65	-.303	-.040	-2.652	34	.012
Pair 7	Clear communication – Clear communication postintervention	-.486	.507	.086	-.660	-.312	-5.667	34	.000
Pair 8	Well-planned intervention/flexibility – Well-planned intervention/flexibility postintervention	-.286	.458	.007	-.443	-.128	-3.688	34	.001
Pair 9	Being skillful – Being skillful postintervention	-.171	.382	.065	-.303	-.040	-2.652	34	.012
Pair 10	Evaluation/self-analysis - Evaluation/self-analysis postintervention	-.571	.502	.085	-.744	-.399	-6.733	34	.000
Pair 11	Commitment to improvement – commitment to improvement postintervention	-.314	.417	.080	-.476	-.152	-3.948	34	.000
Pair 12	Total LCJT Score -Total LCJT Score Postintervention	-4.429	1.461	.247	-4.930	-3.927	-17.933	34	.000

The preintervention and postintervention scored reflected the scores obtained by the students in the 11 areas of the Lasater clinical judgment rubric. Those 11 areas represent the four components of Tanner's clinical judgment model of noticing, interpreting, responding, and reflecting. Each component of Tanner's clinical judgment model is reflective of clinical reasoning. All 11 areas showed significant improvements on postintervention scores (see Table 4). The resulted t of 17.933 exceeds the critical t value making the paired t test statistically significant demonstrating a definite difference in the pre and postintervention values. This allows me to reject the null hypothesis that questioning as a problem-based learning strategy has no influence on the development of clinical reasoning in prelicensure nursing students.

Summary

The purpose of this study was to investigate the influence of questioning as a problem-based learning strategy on clinical reasoning in prelicensure nursing students using retrospective data from a nursing program. All assumptions surrounding the paired t test were met for the research question. The null hypothesis was rejected when the t exceeded the critical t making the t test statistically significant. Therefore, the hypothesis that questioning as a problem-based learning strategy influences the development of clinical reasoning in prelicensure nursing students is true.

In Chapter 5, I will address the results of this study and to what extent these findings will have on the knowledge of nursing as a discipline. The implications of the results will be discussed as they relate to positive social change. There will be one final reflection on the knowledge obtained and the recommendations for further research.

Chapter 5: Discussion, Conclusions, and Recommendations

Clinical reasoning is the basis for every decision made by nurses. Those decisions or clinical judgments will have a profound impact on patient care outcomes. Nurses with sound clinical reasoning skills have a positive impact on patient outcomes while those with poor reasoning skills may result in adverse patient outcomes (Billings & Halstead, 2016). For this reason, clinical reasoning and judgment are essential end of program outcomes for prelicensure nursing students (Bussard, 2018; Tyo & McCurry, 2019).

The purpose of this study was to investigate the influence of questioning as a PBL strategy on clinical reasoning in prelicensure nursing students. I used a paired *t* test to analyze data collected. Results demonstrated a significant increase in clinical judgment with the use of a series of questions to stimulate a more complex reasoning process in clinical judgment. In this final chapter, I analyze and interpret the findings in the context of Tanner's clinical judgment model using the LCJR. Tanner's clinical judgment model is the foundation of many studies on clinical reasoning and clinical judgment (Ashley & Stamp, 2014; Bussard, 2015; Jessee & Tanner, 2016; Monagle et al., 2018). I discuss limitations of the study, describe recommendations for future research, and discuss the potential impact of the study on positive social change.

Interpretation of the Findings

The findings of this study came to the same conclusion as the 2013 Shin and Kim study that PBL in nursing had a positive effect on development of clinical reasoning in the education of nurses. This study focused on the problem-based teaching/learning strategy of questioning. Students showed an increase on the assessment scores from

preintervention (questioning) to postintervention by a mean of 4.43 points. This improvement was demonstrated not only in clinical judgment but also in clinical reasoning. Clinical reasoning is the complex decision making the process that uses nursing knowledge and several methods of thinking in order to make clinical judgments (Tyo & McCurry, 2019). It is where the students gather and analyze data or cues, determine the relevance of the information, and look for interventions that could improve patient outcomes (Vallente, 2016).

With the pre and postassessments being on the same day, I was unable to determine if the improvements in clinical reasoning were retained over time. Students uncover their clinical reasoning skills by observing their instructors thought processes then applying them in the same simulation (Lasater, et al., 2014). Other problem-based strategies that had previously been studied are case studies and clinical scenarios, web-based case studies, collaborative learning, concept mapping, experiential or clinical practicum, reflective journaling, and simulation. To add to the body of knowledge on developing clinical reasoning, I chose to study questioning and its influence on clinical reasoning in the prelicensure nursing student.

The LCJR was used to measure the clinical judgment tools (Appendix A) that served as the preintervention and postintervention assessment. Gonzalez (2018) posited that the LCJR is an effective tool for evaluating clinical reasoning skills. The LCJR has also successfully been used to evaluate clinical judgment behaviors in the clinical setting (Kavanagh & Szweda, 2017; Manetti, 2018; Nielson et al., 2016). Success was demonstrated in each of these studies using the LCJR to teach clinical reasoning and

judgment. A paired *t* test was used to measure differences in the students' clinical

reasoning ability prior to and after the introduction of the intervention of questioning. In

this current study, all students showed an increase in postintervention scores using the

LCJR. The LCJR (Appendix B) has 11 behavioral components based on the four

performance aspects of Tanner's clinical judgment model: noticing, interpreting,

responding, and reflecting making it closely aligned with the theoretical framework of

this study (Lasater, 2011).

Limitations of the Study

Limitations are present in most research studies. This study was no exception. I

identified three limitations. The first use the use of a convenience sample which does not

allow the study to be generalized to a larger population. The second limitation was the

fact that there was no way of knowing whether clinical reasoning was impacted by

previous experience, knowledge, or skill. The comparison of a preintervention and

postintervention should allow for a determination of growth regardless of the student's

starting point. However, with the age range of 21-39, students came into the program

with different levels of reasoning based on previous experiences. The postintervention

assessment was completed after the intervention and repeat of the simulation. With such a

short time between evaluations, there is a possibility that some students may have

memorized important reasoning processes. Having the students utilize their reasoning

skills in the repeat simulation would have minimized the limitation. The last limitation

identified was time. The study evaluated retrospective data from nursing students in a

clinical course over several sections of the course. This snapshot in time is dependent

upon conditions at that time. While the students showed improvement after the intervention of questioning, there is no way to determine whether the student would retain their improved reasoning skills over time.

Recommendations

It is recommended that additional research be conducted on the various educational strategies that could potentially influence clinical reasoning and judgment to boost this body of knowledge. Nurse educators need evidenced-based educational strategies as they prepare their students to navigate complex healthcare problems. Clinical judgment and the process of clinical reasoning is the goal to providing effective and safe nursing care (Brenton, 2018; NSCBN, 2019). The fact that 50% of medical errors involve a new nurse, with 65% of those errors involving some lapse of clinical judgment is unacceptable (Brenton, 2018; NCSBN, 2019).

I would recommend a repeat of this study using a larger randomized sample. This could allow for a generalization to the larger population of prelicensure nursing students. In addition, comparison of different age groups and students with previous careers could add additional validity to the study. A longitudinal study, including an additional measurement of postintervention at various intervals throughout the nursing program, would help to determine if the improved reasoning skills are retained over time.

Implications

The mission of Walden University is to transform career practitioners into scholar-practitioners who can effect positive social change (Walden University, 2021). This study may promote positive social change as the results will help fill the gap in the

literature by providing research results on an individual problem-based educational strategy to assist similar educational programs in the development of clinical reasoning. The goal of problem-based learning is to improve reasoning skills and solving real life problems (Breytenbach, et al, 2017; Wosinski, et al, 2018). The use of evidenced-based learning strategies to promote clinical reasoning in nursing students supports the new graduate to make better clinical judgments as they transition into practice making it critical to achieving desirable patient outcomes (Kavanagh & Szweda, 2017). Students with sound clinical reasoning skills are more practice ready, have more confidence, and transition as new graduates into practice more easily (Parker, et al, 2014).

Nurse Educators may also be impacted. The use of evidenced-based teaching/learning strategies give nurse educators the tools to effectively impact the knowledge, skills, and attitudes of nursing students in their development of clinical reasoning. Robeznieks (2015) reported that the New York-based Jonas Center for Nursing Excellence estimates that each nurse educator has the potential to affect the care of 3.6 million patients. This number was based on the number of nurses each instructor could teach throughout their career along with the number of patients for whom those nurses could provide care throughout their career. Improving the clinical reasoning skills of nursing students truly effects millions of patients. Better patient outcomes will have the potential to reduce inpatient length of stay with more efficient care. More efficient and safe care can lead to savings in resources and dollars for healthcare in general.

Practice ready new graduates have the potential to decrease orientation costs of new graduates. The readiness of new graduates to enter the workforce is an international

concern creating not only the necessity of longer orientation programs, but many hospitals have added extended residency programs for new graduate support (Baumann, Hunsberger, Crea-Arsenio, & Askar-Danesh, 2017; Parker et al., 2014).

Conclusion

There is a great concern over the facts that 50% of medical errors involve a new nurse with 65% of errors involving a lapse of clinical judgment (Brenton, 2018; NCSBN, 2019). Another area of concern is that only 23 % of new graduate nurses are safely able to recognize problems due to urgent changes in patient condition and demonstrate appropriate management of those problems (Kavanaugh & Szweda, 2017). Finding ways to develop clinical reasoning skills in prelicensure nursing students is key to helping graduate nurses make sound clinical judgment. The findings of this study indicated that the use of questioning had a positive effect on the development of clinical reasoning in prelicensure nursing students as every student showed an increase in the LCJR scores postintervention. Increasing clinical reasoning and judgment skills in nursing students will help them recognize patient cues (noticing), analyze patient data (interpreting), generating solutions and taking action (responding), and evaluation (reflection) completing Tanner's clinical judgment model.

The benefit to nurse educators cannot be overlooked. As nurse educators look for evidenced-based educational strategies to help them facilitate the development of clinical reason in their students, this study will provide an additional strategy for consideration, taking them one step closer to graduating practice ready nurses.

References

Ampatzoglou, A., Bibi, S., Avgeriou, P., Verbeek, M., Chatzigeorgiou, A. (2019).

Identifying, categorizing and mitigating threats to validity in software engineering

secondary studies. *Information and Software Technology*, *(2)*106, 201-230.

https://doi.org/10.1016/j.infsof.2018.10.006

Ashley, J. & Stamp, K. (2014). Learning to think like a nurse: The development of

clinical judgment in nursing students. *Journal of Nursing Education, 53*(9), 519-

525. https://doi.org/10.3928/01484834-20140821-14

Barrows, H. S. (1986). A taxonomy of problem-based learning methods. *Medical*

Education 20(6), 481-486.

Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief

overview. *New Directions for Teaching and Learning, 68,* 3-12.

Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to*

medical education. Springer Publishing Company.

Baumann, A., Hunsberger, M., Crea-Arsenio, M., & Akhtar-Danesh, N. (2017). Policy to

practice: Investment in transitioning new graduates to the workplace. *Journal of*

Nursing Practice, 26(2018), 373-381. https://doi.org/10.1111/jonm.12340

Benner, P., Sutphen, M., Leonard, V., & Day, L. (2010). *Educating nurses: A call for*

radical transformation. Jossey-Bass.

Benner, P. (2015). Curricular and pedagogical implications for the Carnegie Study,

Educating Nurses: A call for radical transformation. *Asian Nursing Research*, (1),

1. https://doi.org/10.1016/j.anr.2015.02.001

Billings, D. M. & Halstead, J. A. (2016). *Teaching in nursing,* 5th ed. Elsevier.

Brenton, A. (2018). Next generation NCLEX project (webinar). Chicago, Il: National

    Council of State Boards of Nursing. https://ncsbn.org/130064.htm

Breytenbach, C., Ham-Baloyi, W. t., & Jordan, P. J. (2017). An integrative literature

    review of evidence-based teaching strategies for nurse educators. *Nursing*

    Education Perspectives, 38(4), 193-197.

    https://doi.org/10.1097/01.NEP.0000000000000181

Bristol, T. J. (2019). Next gen learning for the new National Council Licensure

    Examination for Registered Nurses. *Teaching and Learning in Nursing, 14*(2019),

    309-311.

Burbach, B. E., Barnason, S., & Hertzog, M. (2014). Preferred thinking style, symptom

    recognition, and response by nursing students during simulation. Western Journal

    of Nursing Research, *37*(12), 1563–1580.

    https://doi.org/10.1177/0193945914539739

Bussard, M. (2015). The nature of clinical judgment development in reflective journals.

    Journal of Nursing Education, 54(8), 451-454.

Carvalho, A. L. & Oliveria, M. V. (2011). Nursing diagnosis: Educational strategy based

    on problem-based learning. *Revista Latino-American Enfermagem*, *19*(4), 936-

    942.

Carvalho, D. P. S. R. P., Azevedo, I. C., Cruz, G. K. P., Mafra, G. A. C., Rego, A. L. C.,

    Vitor, A. F., Santos, V. E. P., Cogo, A. L. P., & Ferreira Júnior, M. A. (2017).

Strategies used for the promotion of critical thinking in nursing undergraduate education. *Nurse Education Today, 57*(2017), 103-107.

Carvalho, E. C. de, Oliveira-Kumakura, A. R. de S., & Morais, S. C. R. V. (2017). Clinical reasoning in nursing: teaching strategies and assessment tools. *Revista Brasileira De Enfermagem*, *70*(3), 662–668. https://doi.org/10.1590/0034-7167-2016-0509

Chan, Z. C. Y. (2014). Students' and experts' perspectives on three learning and teaching activities. *Nurse Education in Practice*, *14*(5), 449–454. https://doi.org/10.1016/j.nepr.2014.03.002

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches,* 4th ed. Sage Publications.

Dawson, T., Comer, L., Kossick, M. A., & Neubrander, J. (2014). Can script concordance testing be used in nursing education to accurately assess clinical reasoning skills? *Journal of Nursing Education*, *53*(5), 281–286. https://doi.org/10.3928/0148434-20140321-03

Dickison, P., Haerling, K. A., & Lasater, K. (2018). Integrating the national council of state boards of nursing clinical judgment model into nursing education frameworks. *Journal of Nursing Education, 58*(2), 72-78.

Ergai, A., Cohen, T., Sharp, J., Wiegmann, D., Gramopadhye, A., & Shappell, S. (2016). Assessment of the Human Factors Analysis and Classification System (HFACS): Intra-rater and inter-rater reliability. *Safety Science*, *82*, 393–398. https://doi-org/10.1016/j.ssci.2015.09.028

Faul, F., Erdfelder, E., Lang, A.-G. & Buchner, A. (2007). G*Power 3: A flexible

statistical power analysis program for the social, behavioral, and biomedical

sciences. *Behavior Research Methods*, 39, 175-191.

Field, A. (2017). *Discovering Statistics Using IBM SPSS Statistics,* 5th ed. Houston, TX,

Sage Productions, Ltd.

Forister, J. G. & Blessing, J. D. (2016). *Research and Medical Literature for Health

Professionals*, 4th ed. Burlington, MA: Jones & Bartlett Learning.

Frankfort-Nachmias, C. & Leon-Guerrero, A. (2015). *Social Statistics for a Diverse

Society,* 7th ed. Thousand Oakes, CA; Sage Publications.

Gilkison, A. (2003). Techniques used by 'expert' and 'non-expert' tutors to facilitate

problem-based learning tutorials in an undergraduate medical curriculum.

Medical Education, 37(1), 6–14. http://dx.doi.org/10.1046/j.1365-

2923.2003.01406.x

Gonzalez, L. (2018). Teaching clinical reasoning piece by piece: A clinical reasoning

concept-based learning method. *Journal of Nursing Education, 57*(12). 727-735.

Gonzol, K. & Newby, C. (2013). Facilitating clinical reasoning in the skills laboratory:

Reasoning model versus nursing process-based skills checklist. *Nursing

Education Perspectives, 34*(4), 265-267.

Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: a guide for

non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2),

486–489. https://doi-org/10.5812/ijem.3505

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The Practice of Nursing Research: Appraisal, Synthesis, and Generation of Evidence,* 7th ed. St; Louis, MO: Elsevier Saunders.

Hammond, K. R. (1978). Toward increasing competence of thought in public policy formation. In K. R. Hammond (Ed.), Judgment and decision in public policy formation (pp. 11–32). Boulder, CO: Westview.

Harmon, M. M. & Thompson, C. (2015). Clinical reasoning in prelicensure nursing students. *Teaching and Learning in Nursing, 10*, 63-70.

Herron, E. K. (2017). New graduate nurses' preparation for recognition and prevention of failure to rescue: A qualitative study. *Journal of Clinical Nursing, 27*, e390-e401. https://doi:10.1111/jocn.14016

Institute of Medicine, (2010). *The future of nursing: Leading the change, advancing health*. Washington, D.C.: National Academic Press.

Jessee, M. A. (2018). Pursuing improvement in clinical reasoning: The integrated clinical education theory. *Journal of Nursing Education, 57*(1), 7-13.

Jessee, M. A. & Tanner, C. (2016). Pursuing improvement in clinical reasoning: Development of the clinical coaching interactions inventory. *Journal of Nursing Education, 55*(9), 495-504.

Jones, M. (2008). Developing clinically savvy nursing students: An evaluation of problem-based learning in an Associate Degree Program. *Nursing Education Perspectives, 29*(5), 278-283.

Kaur, S., Powell, S., He, L., Pierson, C. R., & Parikh, N. A. (2014). Reliability and Repeatability of Quantitative Tractography Methods for Mapping Structural White Matter Connectivity in Preterm and Term Infants at Term-Equivalent Age. *PLoS ONE*, *9*(1), 1–14. https://doi-org/10.1371/journal.pone.0085807

Kautz, D. D., Kuiper, R., Pesut, D. J., & Williams, R. L. (2006). Using NANDA, NIC, and NOC (NNN) Language for Clinical Reasoning with the Outcome-Present State-Test (OPT) Model. *International Journal of Nursing Terminologies & Classifications*, *17*(3), 129–138.

Kavanagh, J. M. & Szweda, C. (2017). A crisis in competency: The strategic can ethical imperative assessing new graduate nurses' clinical reasoning. *Nursing Education Perspectives, 38*(2), 57-62.

Koharchik, J. M., Caputi, L., Robb, M. & Culleiton, A. L. (2015). Fostering clinical reasoning in nursing students. *American Journal of Nursing, 115*(1), 58-61.

Kubin, L., Fogg, N., Wilson, C. E., & Wilson, J. (2013). Comparison of Student Learning Among Three Teaching Methodologies in the Pediatric Clinical Setting. *Journal of Nursing Education*, *52*(9), 501–508. https://doi-org/10.3928/01484834-20130819-07

Larue, C. (2008). Group learning strategies for nursing students' reflections on the tutor role. *International Nurse Education Scholarship, 5*(1),1-17. https://dx.doi.org/10.2202/1548-923X.1604

Lasater, K. (2007). Clinical judgment development: Using simulation to create an assessment rubric. *Journal of Nursing Education, 46*(11). 496-503.

Lasater, K. (2011). Clinical judgment: The last frontier for evaluation. *Nurse Education in Practice, 11*(2011), 86-92.

Lasater, K, Johnson, E. A., Ravert, P., & Rink, D. (2014). Role modeling clinical judgment for an unfolding older adult simulation. *Journal of Nursing Education, 53*, 257-264.

Levett-Jones, T., Hoffman, K., Dempsey, J., Jeong, S. Y., Noble, D., Norton, C. A., Roche, J., & Hickey, N. (2010). The 'five rights' of clinical reasoning: An educational model to enhance nursing students' ability to identify and manage clinically 'at risk' patients. *Nurse Education Today*, *30*(6), 515–520. https://doi-org /10.1016/j.nedt.2009.10.020

McMillian, M. A. & Dwyer, J. (1989). Changing times, changing paradigm (2): The Macarthur experience. *Nursing Education Today, 9,* 93-99.

Merisier, S., Larue, C., & Boyer, L. (2018). How does questioning influence nursing students' clinical reasoning in problem-based learning? A scoping review. *Nurse Education Today, 65*(2018), 108-115. https://doi.org/10.1016/j.nedt.2018.03.006

Monagle, J., Lasater, K., Stoyles, S. & Dieckmann, N.F. (2018). New graduate experience in clinical judgment: What academic and practice educators need to know. *Nursing Education Perspectives, 39,* 201-207. https://doi.org/10.1097/01.NEP.0000000000000336

Murphy, J. I. (2004). Using focused reflection and articulation to promote clinical reasoning: an evidence-based teaching strategy. *Nursing Education Perspectives*

(National League for Nursing), *25*(5), 226–231. National Council of State Boards of Nursing. (2019). *Next Generation NCLEX News, (Winter).*

Nielsen, A. (2016). Concept-based learning in clinical experiences.: Bring theory to clinical education for deep learning. *Journal of Nursing Education, 55*, 365-371.

Nieswiadomy R. M. & Bailey, C. (2018). *Foundations of Nursing Research*, 7th ed. New York: Pearson.

Pandis, N. (2015). Comparison of 2 means for matched observations (paired t test) and t test assumptions. *American Journal of Orthodontics and Dentofacial Orthopedics: Official Publication of The American Association of Orthodontists, Its Constituent Societies, And The American Board of Orthodontics*, *148*(3), 515–516. https://doi-org/10.1016/j.ajodo.2015.06.011

Papp, K., Huag, M., Lauzon Clabo, L., Delva, D., Fischer, M., Konopasek, L., Schwartzstein, R., & Gusic, M. (2014). Milestones of critical thinking: A developmental model for medicine and nursing. *Academic Medicine, 89*(5), 715-720.

Parker, V., Giles, M., Lantry, G., & McMillan, M. (2014). New graduate nurses' experiences in their first year of practice. Nurse Education Today, 34(1), 150-156. https://doi-org/10.1016/j.nedt.2012.07.003

Prosser, M., & Sze, D. (2014). Problem-based learning: Student learning experiences and outcomes. *CLINICAL LINGUISTICS & PHONETICS*, *28*(1–2), 131–142. https://doi.org/10.3109/02699206.2013.820351

Robeznieks, A. (2015). Looming nursing shortage fueled by fewer faculty, training sites. *Modern Healthcare, 45*(4), 9.

Russell, J. S., McWilliams, M., Chasen, L., & Farley, J. (2011). Using clickers for clinical reasoning and problem solving. *Nurse Educator*, *36*(1), 13–15. https://doi-org./10.1097/NNE.0b013e3182001e18

Sedgwick, M. G., Grigg, L., & Dersch, S. (2014). Deepening the quality of clinical reasoning and decision-making in rural hospital nursing practice. *The International Electronic Journal of Rural and Remote Health Research, Education Practice and Policy, (14)*, 1-13.

Silvestre, J. H. (2017). A Multisite Study on a New Graduate Registered Nurse Transition to Practice Program: Return on Investment. *Nursing Economic$*, *35*(3), 110–118.

Simon, M. K. (2011). Dissertation and scholarly research: Recipes for success (2011 Ed.). Seattle, WA, Dissertation Success, LLC.

SPC for Excel. (2018). Retrieved from https://www.spcforexcel.com/knowledge/basic-statistics/are-skewness-and-kurtosis-useful-statistics

Stevens, K. R. (2013). The teaching strategies used by nurse educators should be based on sound evidence of best practices. *Nursing Education Perspectives, 38*(4), 193-197

Tanner, C. A. (2006) Thinking like a nurse: A research-based model of clinical judgment in nursing. *Journal of Nursing Education, 45*(6), 205-211.

Tyo, M. B. & McCurry, M. K. (2018). An integrative review of clinical reasoning teaching strategies and outcome evaluation in nursing education. *Nursing*

Education Perspectives, 40(1), 11-17.

https://doi.org/10.1097/01.NEP.0000000000000375

Vallente, R. P. (2016). Clinical reasoning. *Salem Press Encyclopedia of Health.*

Victor, J. (2017). Improving clinical nursing judgment in prelicensure students. *Journal of Nursing Education, 56*(12), 733-736

Walden University. (2017). Walden 2020: A vision for social change. Retrieved from https://www.waldenu.edu/-/media/Walden/files/about-walden/walden-university-2017-social-change-report-final-v-2.pdf

Wosinski, J., Belcher, A., E., Dürrenberger, Y., Allin, A-C., Stormacq, C., & Gerson, L. (2018). Facilitating problem-based learning among undergraduate nursing students: A qualitative systematic review. *Nursing Education Today, 60*(2018), 67-74. https://doi.org/10.1016/j.nedt.2017.08.015

Appendix A: Clinical Judgement Tool

This exercise is designed to help develop your clinical judgement and decision making. You will complete this form twice today. First after completion of your simulation and a second time after your instructor askes a series of questions to help you think more deeply.

Noticing: This will help to identify expected patterns, notice deviations from expected patterns, and to seek relevant information.
- What did you notice first about your patient?
  - Overall assessment
  - Expected findings from report
  - Actual findings
- What was different than what you expected? Have you seen this before in another patient?
- What other information would be helpful? How can you get that information? Were you able to obtain it?
  - Have they seen these symptoms before?
  - Labs and diagnostics
  - Comorbidities
  - Psychosocial

Interpreting: This will help you to make sense of the data and learn to prioritize the data.
- How did you prioritize the patient information/data? In other words, what was most important for this patient now?
- On what did you base your choice of intervention? If intuition, what kinds of data might offer evidence to support your gut feeling?
  - Talk about your patient's vital signs, lab values, and diagnostic test results in the last
    24 hours. What was normal and abnormal and how is it relevant to your patient?
    - Group relevant data together
  - Talk about the patient's medications that were administered in the last 24 hours.
    - What was the patient's response?
    - What indications do you have that the treatment is effective or ineffective?
    - Did you get the expected outcomes?

Responding: Are you responding in a calm, confident manner? Is there evidence of clear communication? If not, why?

- What was your approach with the patient? How comfortable did it make you feel?
- How do you think you gained your patient's/family's trust? What did you say to the patient? To the family members?
- What factors, including patient feedback, impacted the treatment plan?
- How did your skill compare to nursing standards of care?

Reflecting: How you would evaluate or self-analyze your performance?

- What went well? What didn't go as smoothly as you planned?
  - Why or why not?
- What would you do differently if you had the opportunity?
- How well did you feel that you responded in the RN role?
  - Why or why not?
  - What would you do differently?

Appendix B: Lasater's Clinical Judgment Rubric

Dimension	Exemplary (4 points)	Accomplished (3 points)	Developing (2 points)	Beginning (1 point)	Score
Effective noticing involves:					
Focused Observation	Focuses observation appropriately; regularly observes and monitors a wide variety of objective and subjective data to uncover any useful information	Regularly observes and monitors a variety of data, including both subjective and objective; most useful information is noticed; may miss the most subtle signs	Attempts to monitor a variety of subjective and objective data but is overwhelmed by the array of data; focuses on the most obvious data, missing some important information	Confused by the clinical situation and the amount and kind of data; observation is not organized and important data are missed, and/or assessment errors are made	
Recognizing deviations from Expected Patterns	Recognizes subtle patterns and deviations from expected patterns in data and uses these to guide the assessment	Recognizes most obvious patterns and deviations in data and uses these to continually assess	Identifies obvious patterns and deviations, missing some important information; unsure how to continue the assessment	Focuses on one thing at a time and misses most patterns and deviations from expectations; misses opportunities to refine the assessment	
Information seeking	Assertively seeks information to plan intervention: carefully collects useful subjective data from observing and interacting with the patient and family	Actively seeks subjective information about the patient's situation from the patient and family to support planning interventions; occasionally does not pursue important leads	Makes limited efforts to seek additional information from the patient and family; often seems not to know what information to seek and/or pursues unrelated information	Is ineffective in seeking information; relies mostly on objective data; has difficulty interacting with the patient and family and fails to collect important subjective data	

Effective interpreting involves:					
Prioritizing data	Focuses on the most relevant and important data useful for explaining the patient's condition	Generally, focuses on the most important data and seeks further relevant information but also may try to attend to less pertinent data	Makes an effort to prioritize data and focus on the most important, but also attends to less relevant or useful data	Has difficulty focusing and appears not to know which data are most important to the diagnosis; attempts to attend to all available data	
Making sense of data	Even when facing complex, conflicting, or confusing data, is able to (a) note and make sense of patterns in the patient's data, (b) compare these with known patterns (from the nursing knowledge base, research, personal experience, and intuition), and (c) develop plans for interventions that can be justified in terms of their likelihood of success	In most situations, interprets the patient's data patterns and compares with known patterns to develop an intervention plan and accompanying rationale; the exceptions are rare or in complicated cases where it is appropriate to seek the guidance of a specialist or a more experienced nurse	In simple, common, or familiar situations, is able to compare the patient's data patterns with those known and to develop or explain intervention plans; has difficulty, however, with even moderately difficult data or situations that are within the expectations of students; inappropriately requires advice or assistance	Even in simple, common, or familiar situations, has difficulty interpreting or making sense of data; has trouble distinguishing among competing explanations and appropriate interventions, requiring assistance both in diagnosing the problem and developing an intervention	
Effective responding involves:					
Calm, confident manner	Assumes responsibility; delegates team assignments; assesses	Generally, displays leadership and confidence and is able to	Is tentative in the leader role; reassures patients and families in	Except in simple and routine situations, is stressed and	

	patients and reassures them and their families	control or calm most situations; may show stress in particularly difficult or complex situations	routine and relatively simple situations, but becomes stressed and disorganized easily	disorganized, lacks control, makes patients and families anxious or less able to cooperate	
Clear communication	Communicates effectively; explains interventions; calms and reassures patients and families; directs and involves team members, explaining and giving directions; checks for understanding	Generally, communicates well; explains carefully to patients; gives clear directions to team; could be more effective in establishing rapport	Shows some communication ability (e.g., giving directions); communication with patients, families, and team members is only partly successful; displays caring but not competence	Has difficulty communicating; explanations are confusing; directions are unclear or contradictory; patients and families are made confused or anxious and are not reassured	
Well -planned intervention/ flexibility	Interventions are tailored for the individual patient; monitors patient progress closely and is able to adjust treatment as indicated by patient response	Develops interventions on the basis of relevant patient data; monitors progress regularly but does not expect to have to change treatments	Develops interventions on the basis of the most obvious data; monitors progress but is unable to make adjustments as indicated by	Focuses on developing a single intervention, addressing a likely solution, but it may be vague, confusing, and/or incomplete; some monitoring may occur	
Being skillful	Shows mastery of necessary nursing skills	Displays proficiency in the use of most nursing skills; could improve speed or accuracy	Is hesitant or ineffective in using nursing skills	Is unable to select and/ or perform nursing skills	

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

©2005, Kathie Lasater, EdD, RN. Developed from Tanner's (2006) Clinical Judgment Model.

Appendix C: Guided Intervention Questions

The simulation used in this study was from Simulation in Nursing Education –

Medical-Surgical Scenarios COPD Spontaneous Pneumothorax (2014). A series of

guided questions were used as the intervention between pre and post intervention

evaluation. The questions were designed to encourage a deeper thought process based on

Tanner's clinical judgment model and Lasater's clinical judgment rubric. The questions

used are as follows. (Faculty talking points in parentheses)

Noticing:

- Based on your report, what assessment data would you collect next?

  o Vital signs (elevated heart rate, respiratory rate, and blood

     pressure)

  o Orientation (Alert and oriented times 3)

  o Focused respiratory assessment

     ▪ Coarse crackles noted bilaterally

     ▪ Shortness of breath

     ▪ Persistent forceful coughing

- What changes or cues did you notice after the first 5 minutes of the

  scenario?

  o Vital Signs (Increasing heart rate, respiratory rate, and blood

     pressure)

  o Abnormal skin color (pale, dusky)

  o Increased work of breathing

- o Complaint of chest pain

    - ▪ Focused assessment coarse crackles on right but no lung

        sounds on the left

    - o Oxygen saturation 76%

- What complication might this patient be having? (pneumothorax)

- What other symptoms might this patient have? (Dyspnea, increased use of

    accessory muscles, increasing hypoxemia, central cyanosis, and trachea

    deviation shifted to the right)

Interpreting:

- What relevant data led you to the conclusion that the patient might have a

    pneumothorax?

    - o Vital signs, absence of lung sounds on the left, increased work of

        breathing (use of accessory muscles), low oxygen saturation, central

        cyanosis

Responding:

- Based on your assessment of the patient cues/data, what is the priority

    diagnosis? (Impaired gas exchange)

- How did you communicate this to the physician? (SBAR)

- What did or could you have said to the client to reassure them?

- Did you anticipate the chest tube? Why or why not?

- Describe the set up and monitoring of the chest tube. Were you confident

    in your skills?

Reflecting:

- What is your biggest takeaway after completing this simulation?

- After our discussion, would you have done differently if you had had the opportunity?

- What do you feel are your strengths? Weaknesses? What do you plan to do to improve on your weaknesses?

Appendix D: Permission to Use Tool

Teresa, I'm so sorry, I thought I'd sent you my standard response for permission, but clearly, I did not. Here it is:

Thank you for your interest in the Lasater Clinical Judgment Rubric (LCJR). You have my permission to use the tool for your project. I ask that you (1) cite it correctly, and (2) send me a paragraph or two to let me know a bit about your project when you've completed it, including how you used the LCJR. In this way, I can help guide others who may wish to use it. Please let me know if it would be helpful to have an electronic copy.

You should also be aware that the LCJR describes four aspects of the Tanner Model of Clinical Judgment—Noticing, Interpreting, Responding, and Reflecting—and as such, does not measure clinical judgment because clinical judgment involves much of what the individual student/nurse brings to the unique patient situation (see Tanner, 2006 article). We know there are many other factors that impact clinical judgment in the moment, many of which are impacted by the context of care and the needs of the particular patient.

The LCJR was designed as an instrument to describe the trajectory of students' clinical judgment development over the length of their program. The purposes were to offer a common language between students, faculty, and preceptors in order to talk about students' thinking and to serve as a help for offering formative guidance and feedback (See Lasater, 2007, 2011). For measurement purposes, the rubric appears to be most useful with multiple opportunities for clinical judgment vs. one point/patient in time.

Please let me know if I can be of help,

Kathie

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