Effect of an Experiential Learning Model for Simulation Design on Clinical Nursing Judgment Development in Pre-Licensure Baccalaureate Nursing Students

Joyce Victor Chmil

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EFFECT OF AN EXPERIENTIAL LEARNING MODEL FOR SIMULATION DESIGN
ON CLINICAL NURSING JUDGMENT DEVELOPMENT IN PRE-LICENSURE
BACCALAUREATE NURSING STUDENTS

A Dissertation
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In partial fulfillment of the requirements for
the degree of Doctor of Philosophy

By
Joyce Victor Chmil

May 2014
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ON CLINICAL NURSING JUDGMENT DEVELOPMENT IN PRE-LICENSURE
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ABSTRACT

EFFECT OF AN EXPERIENTIAL LEARNING MODEL FOR SIMULATION DESIGN ON CLINICAL NURSING JUDGMENT DEVELOPMENT IN PRE-LICENSURE BACCALAUREATE NURSING STUDENTS

By

Joyce Victor Chmil

May 2014

Dissertation supervised by Melanie Turk, PhD, RN.

Simulation is an experiential learning process used in nursing education to develop and evaluate competencies, including clinical judgment (Berragan, 2011; Jeffries, 2012), yet the effectiveness of simulation in nursing education is not sufficiently evaluated (Foronda, Liu, & Bauman, 2013) and simulation design is not adequately theory-based (Kaakinen & Arwood, 2009; Rourke, Schmidt, & Garga, 2010; Jeffries, 2012; Rodgers, 2013). In this study, Kolb’s Model of Experiential Learning (Kolb, 1984; 1999) was employed to create an experiential learning simulation design. A quasi-experimental study was used to test the effects of this new design on clinical nursing judgment development and its relationship to simulation performance. An independent samples t-test showed clinical nursing judgment development of students engaged in a simulation experience using the experiential learning simulation design ($M = 27.81, SD =$
4.84) was significantly higher than clinical nursing judgment development of students who were engaged in a traditional design, \((M = 20.75, SD = 3.96), p < .001\). There was a significant positive correlation between clinical nursing judgment development and simulation performance \((r = .69, p < .001)\) in the experiential learning group. Regression analysis showed 47% of the variance in simulation performance as measured by the C-SEI was associated with clinical nursing judgment development as measured by the LCJR, \(R^2 = .467, p < .001\). Findings suggest that when simulation design is fully based on the experiential learning model clinical nursing judgment is more highly developed. This judgment is significantly positively correlated with competency in simulation performance. It is recommended for future research that the study be repeated using different samples, scenarios, and points in the trajectory of clinical nursing judgment development. The relationships between clinical nursing judgment development, simulation performance, and clinical performance also need to be analyzed.
DEDICATION

This dissertation is dedicated to my father, Eugene Victor, my role model in life and my guardian angel throughout my doctoral studies.
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Chapter 1

Introduction

Simulation is an experiential learning process that develops the clinical judgment of nurses (Jeffries, 2007; Ravert & McAgooes, 2012). While various theoretical frameworks have influenced simulation design, at present, there is no simulation design that fully operationalizes any specific theoretical model (Rodgers, 2013).

Since the pedagogy of simulation in nursing is based on experiential learning processes, Kolb’s Model of Experiential Learning (Kolb, 1984) is an apt model for simulation design; yet, the element of active experimentation included in Kolb’s Model, which actively engages the student in preparation for the concrete experience, is consistently omitted from simulation experiences in health care (Rodgers, 2013). If simulation design is to truly be based on experiential learning theory, then all elements of the experiential learning model must be included in the simulation design.

This chapter will identify the purpose of the study, research questions, definition of terms, assumptions, limitations, and the significance to nursing.

Background

Simulation as an experiential learning process is first seen in the literature in the 1970s and early 1980s. Dreyfus and Dreyfus (1980; 1979; 1986) published research on using a simulated learning environment for the acquisition and development of new skill sets and decision-making capabilities. While their research was not specific to nursing, their work established two of the fundamental principles of simulation. First, simulation provides a safe environment in which the learner can practice high-risk skills with minimal risk to self or others (Jeffries, 2005b). Second, simulation allows the learner to
apply knowledge to a situation through the processes of reasoning in order to make sound judgments for action (Morton, 1995).

While the words simulation and clinical nursing judgment are seen in earlier nursing literature, it was not until 2005 that Jeffries suggested the integration of simulation into nursing curricula as a valuable way to provide realistic and safe opportunities for the development of clinical nursing judgment in students (Jeffries, 2005a). Jeffries and Rogers (2007) proposed a framework for the integration of simulation into undergraduate, pre-licensure, nursing curricula, and suggested a conceptual model for simulation called The Nursing Education Simulation Framework. The application of experiential learning theory in this design is limited to the simulation scenario as a concrete experience and debriefing as reflective observation. The design does not include all of the elements of experiential learning theory and there is little to no discussion as to how students actively experiment or plan for their concrete experience/simulation scenario. Studies published between 2005 and 2010, however, do support the use of simulation in pre-licensure nursing curricula as an effective educational method for developing clinical judgment in nursing students (Bambini, Washburn, & Perkins, 2009; Comer, 2005; Jeffries, 2007; Jeffries, 2005a; Lasater, 2007b; Rhodes & Curran, 2005).

In 2009, the International Nursing Association for Clinical Simulation and Learning (INACSL) emerged with a vision of being nursing’s portal to the pedagogy of simulation (INACSL, 2013b). A review of the history of INACSL and the abstracts found on its website for both the annual conference poster and podium presentations and publications in its online journal, *Clinical Simulation in Nursing*, reveal trends in the
pedagogy of simulation over the course of the past decade (INACSL, 2013a). These trends are also seen in the nursing literature at large.

In the first trend, there is published support of simulation as a safe, non-threatening experiential learning process (Bambini et al., 2009; Blum, Borglund, & Parcells, 2010; Cato, Lasater, & Peeples, 2009). There is also an investigation of the techniques used in effective simulation (Bronander, 2011). Techniques with supporting evidence in the literature include human patient simulators (HPS), which are computer-operated manikins with human features such as voice, heart and lung sounds, and vital signs (Bronander, 2011), and standardized patients (SPs), which are humans who are trained to recreate a patient on whom the scenario is based (Wallace, 1997).

This trend was followed by a movement for all simulation experiences to include both a concrete experience, which is the enactment of the simulated scenario using HPS or SPs, and a reflective debriefing session, which is a structured session immediately following the concrete experience of the simulation scenario, in which student performance and attitudes are discussed, and possibly evaluated (Jeffries, 2005a; Mariani, Cantrell, Meakim, Prieto, & Dreifuerst, 2012). This led to another trend: a search for valid and reliable evaluative methods. There was an identified need for measurement tools to evaluate performance, competence, and clinical judgment (Adamson, 2010; Davis & Kimble, 2011; Gubrud-Howe & Sideras, 2011; Kardong-Edgren, Adamson, & Fitzgerald, 2010). Over the past decade, simulation has become a widely used experiential learning strategy in pre-licensure nursing education. In recent years, simulation, as an experiential learning process, was supported by the National Council on State Boards of Nursing (Li, 2007), National League for Nursing (Jeffries, 2007; 2012),
and American Association of Colleges of Nursing (2008). Despite support from these nursing regulatory bodies, the processes of simulation are neither consistently nor adequately rooted in theory (Kaakinen & Arwood, 2009; Rourke, Schmidt, & Garga, 2010).

Theoretical frameworks, such as Kolb’s Experiential Learning Model, have been modified and adapted for use in simulation, but simulation design has not been modified to be based entirely on an experiential learning model. While Kolb’s Model has four elements: abstract conceptualization, active experimentation, concrete experience, and reflective observation (Kolb, 1984), the element of active experimentation is consistently omitted from the simulation experience (Rodgers, 2013). In traditional simulation design, using The Nursing Education Simulation Framework, the focus of the simulation is on the concrete experience element, in which a structured clinical scenario is enacted using HPS or SPs, and the reflective observation element or evaluation, in which student performance and attitudes are discussed and systematically evaluated. This traditional simulation design consists of four phases: scripting, staff development and student orientation, execution, and evaluation (Horn & Carter, 2007). Pre-simulation activities are focused on the instructor’s preparation of the simulation environment and a brief orientation of the students to their assigned roles and objectives for the concrete experience (Horn & Carter, 2007). This design does not include the element of active experimentation and thus, does not make use of structured planning activities for the learner. Also, the element of abstract conceptualization, if included in the simulation experience, is often unstructured, and independently completed by the learner. Unstructured activities addressing these two elements are sometimes integrated prior to
execution of the concrete experience/simulation scenario as a preparatory exercise, after the reflective observation/debriefing as an evaluative exercise, or both before and after to assess for changes in knowledge (Chase-Cantarini & Scheese, 2013).

According to Kolb’s Theory (Kolb, 1984; 1999), experiential learning must include all elements and phases of the learning cycle. Kolb and Kolb (1999; 2009) also stress that for learning to be most meaningful, the learner must be aware of and actively involved in each phase of the cycle. The use of unstructured, independent activities for abstract conceptualization and/or active experimentation in the pre-simulation phase is not consistent with the theoretical framework of the Experiential Learning Model.

**Purpose**

The purpose of this study was to design a simulation experience based on Kolb’s Model of Experiential Learning (1984; 1999), and, using the elements of experiential learning (*abstract conceptualization, active experimentation, concrete experience, and reflective observation*), examine how this theory-based design affects the development of clinical nursing judgment in pre-licensure, baccalaureate, nursing students. The specific aims of this study were to incorporate experiential learning theory into simulation design in order to:

1) Assess for a difference in clinical nursing judgment development in pre-licensure baccalaureate nursing students, when simulations are designed using a traditional approach, with independent, unstructured pre-simulation activities versus an experiential learning model with structured, instructor-facilitated, pre-simulation activities; and
2) Examine the relationship between clinical nursing judgment development and simulation performance in students who complete simulation experiences designed using an experiential learning model.

Research Questions

Kolb’s four elements of experiential learning - abstract conceptualization, active experimentation, concrete experience, and reflective observation - were applied to create a new simulation design for nursing, which included four phases: thinking, planning, performing, and debriefing. The clinical nursing judgment development scores of students engaged in a simulation experience using the experiential learning model were compared to the clinical nursing judgment development scores of students who were engaged in a simulation experience using the traditional design. Using this new, experiential theory-based simulation design, the researcher also examined the relationship between clinical nursing judgment development, as measured using the Lasater Clinical Judgment Rubric (LCJR), and simulation performance, as measured using the Creighton Simulation Evaluation Instrument (C-SEI™). This research study was designed to answer two research questions:

1) Are there differences in clinical nursing judgment development in pre-licensure baccalaureate nursing students, as measured by the Lasater Clinical Judgment Rubric (LCJR) in the simulation setting, when simulations are designed using a traditional approach versus an experiential learning model?

2) Is there a relationship between clinical nursing judgment development and simulation performance in students who complete simulation experiences designed using Experiential Learning Theory?
Definition of Terms

**Simulation design.** Morton (1995) defines simulation as the replication of the essential aspects of a clinical situation so that the situation can be readily understood and managed when it occurs in clinical practice. Simulation allows the learner to apply knowledge to a situation through the processes of reasoning in order to make sound judgments for action (Dreyfus & Dreyfus, 1980; 1986). Simulation is an experiential learning process, which, in accordance with Kolb’s Experiential Learning Theory (Kolb, 1984; 1999), includes not only a concrete experience, but also the processes of conceptualizing, planning, and reflecting that occur before, during, and after the concrete experience.

For the purposes of this study *traditional simulation design* refers to a learning experience based on The Nursing Education Simulation Framework (Jeffries & Rogers, 2007). This traditional simulation design consists of a pre-simulation phase in which learners independently completed unstructured activities to stimulate thinking and planning followed by a concrete experience/simulation scenario and a post-simulation reflection or debriefing (Horn & Carter, 2007; Jeffries & Rogers, 2007). *Experiential learning simulation design* refers to a learning experience that consisted of a pre-simulation phase in which the learner completed structured, instructor-facilitated *thinking* (abstract conceptualization) and *planning* (active experimentation) activities, followed by *performing* (concrete experience) in a structured scenario and post-simulation *debriefing* (reflective observation) activity.

**Thinking.** Abstract conceptualization involves knowledge, thought, and logic rather than analysis of feelings or application of knowledge to a learning situation (Kolb
& Kolb, 2009). The processes of conceptualization are based on knowledge and the analysis of empirics rather than a clinical situation (Benner, 1984). Knowledge can be gained through traditional learning sources such as books, videos, and didactic encounters, as well as past experiences with similar concepts. For the purposes of this study, thinking addressed the element of abstract conceptualization and referred to the phase of simulation design, which attempted to stimulate the learner to apply knowledge, thought, and logic to the concepts associated with the simulation scenario. For the thinking phase, the traditional simulation design used reading assignments given to the student via the course syllabus and completed by the student independently, 1 to 2 weeks prior to the concrete experience of the simulation scenario. Since content related to the concepts relative to the simulation experience was part of the fundamentals course for both groups, these additional reading assignments were not given to the participants in the experimental group. The experiential simulation design used a structured 10-point computer-based, multiple-choice quiz, with answers and rationale provided immediately after the completion of the quiz to actively engage the learner in the process of applying knowledge, thought, and logic to the concepts associated with the simulated scenario (i.e., safety, comfort/pain management, infection control) immediately before moving to a planning activity.

**Planning.** The element of active experimentation was addressed through a planning activity, since planning involves the cognitive and metacognitive processes in which knowledge is applied to a clinical situation (Banning, 2008). In nursing, the cognitive and metacognitive processes used in planning for a clinical experience are referred to as clinical reasoning (Simmons, 2009). Clinical reasoning refers to the
processes used to discern the relevance of the evidence and scientific knowledge as applied to a particular patient (Simmons, 2009). According to Simmons (2009) and Lapkin (2010), clinical reasoning requires both a background of scientific knowledge and a general case or a particular instance in which to apply this knowledge. In this study, *planning* referred to the phase of simulation design that allowed the learner to apply knowledge of associated concepts to a patient scenario before providing care. In the traditional simulation design, the simulated patient’s electronic medical record was available to the student via the course website using Desire 2 Learn (D2L) and students accessed this record independently, 1 to 2 weeks prior to the concrete experience of the simulation scenario. The experiential simulation design used a structured, instructor-facilitated activity - the development of a concept map applicable to the simulation scenario - which was completed immediately before the concrete experience, or performing phase.

**Performing.** The concrete experience of simulation is the replication of the essential aspects of a clinical situation (Morton, 1995) in a safe, non-threatening experiential learning environment (Bambini et al., 2009; Blum et al., 2010; Cato et al., 2009) using tools and techniques, such as human patient simulators (HPS) and standardized patients (SPs) (Bronander, 2011). Standardized patients (SPs) are humans acting in the role of a patient in an attempt to recreate an encounter with a specific clinical patient case (Wallace, 1997). SPs are ideal for use in simulations in which communication is an essential factor in the evaluation (Wallace, 1997). For the purposes of this study, the *performing* phase addressed the element of *concrete experience* and referred to the phase of simulation design in which the learner engaged in the provision
of patient care for a standardized patient (SP) in a simulated clinical environment. Students in the traditional design group were evaluated during the *performing* phase using the Lasater Clinical Judgment Rubric (LCJR). The students engaged in the experiential learning design were evaluated during the *performing* phase for both simulation performance and clinical nursing judgment development, using the Creighton Simulation Evaluation Instrument (C-SEI™) and the Lasater Clinical Judgment Rubric (LCJR), respectively.

**Debriefing.** Reflective observation, or debriefing, involves the metacognitive process used for self-evaluation of the learner and structured review of judgments to build new knowledge for future planning and experiences (Simon, Raemer, & Rudolph, 2010; Mariani et al., 2012). For the purposes of this study, *debriefing* referred to the element of simulation design in which the learner engaged in the evaluation of performance and clinical nursing judgment development, with an instructor, immediately following the performing phase. The Lasater Clinical Judgment Rubric (LCJR) was used to guide the *debriefing* for students in both the traditional and the experiential learning design.

**Clinical nursing judgment development.** Tanner (2006) defines clinical nursing judgment as “an interpretation or conclusion about a patient’s needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p. 204). Clinical judgment can only be developed and assessed when there are observable behaviors that allow for the evaluation of level of mastery in not only cognitive domains, but also in the psychomotor and affective domains (Mariani et al., 2012). The
development and evaluation of clinical judgment comes not only from observable behaviors but also from self-reflection on these behaviors (Lasater, 2011a; 2011b). The Lasater Clinical Judgment Rubric (LCJR) operationalizes Tanner’s Model of Clinical Judgment in Nursing and was used to measure clinical nursing judgment development.

Simulation performance. The National Council of State Boards of Nursing (NCSBN) uses the term simulation performance to describe the student’s abilities to meet set experiential learning outcomes (Li, 2007). These learning outcomes are designed to evaluate behaviors, competency, safety, communication, and confidence (Li, 2007). To maintain consistency with NCSBN, for the purposes of this study, simulation performance is defined as the student’s ability to meet set outcomes for safety, behaviors, competency, communication, and confidence. The Creighton Simulation Evaluation Instrument (C-SEI™) was designed as an Objective Structured Clinical Examination (OSCE) to evaluate simulation performance in the concrete experience of a simulated clinical scenario (Todd, Manz, Hawkins, Parsons, & Hercinger, 2008). Performance evaluation is divided into five sections: safety, assessment, communication, critical thinking, and technical skills. The sections are aligned with the simulation performance categories put forth by NCSBN, with the categories of behaviors and competency addressed in the assessment, critical thinking, and technical skills sections; and confidence addressed in the communication section (Todd et al., 2008). The NCSBN currently uses the C-SEI™ in nation-wide simulation research related to high-stakes simulation testing (Li, 2007). The C-SEI™ was used to measure simulation performance in this study.
Assumptions

Simulation is an experiential learning process in which clinical nursing judgment can be developed and evaluated (Jeffries, 2012; 2007). In accordance with Kolb’s Model of Experiential Learning (1984; 1999; 2009), a simulation design based on the elements of experiential learning involves four phases: thinking, planning, performing, and debriefing. This model presents two assumptions: 1) experiential learning is reliant on active participation in each phase: thinking, planning, performing, and debriefing; and 2) experiential learning is reliant on both the processes of learning and one’s consciousness of being a learner (Kolb & Kolb, 2009; Kolb, 1999). Kolb and Kolb (2009) conclude that knowledge is built not only on the concrete experience but also on the metacognition involved in conceptualization and planning for the concrete experience and the reflection on the concrete experience.

The following were the assumptions underlying this study:

1) Participants had no prior experience in simulations using an experiential learning design.

2) Participants in the experiential learning simulation design group were conscious of and actively engage in all elements and phases of the simulation design.

   a) The pre-simulation thinking phase for the experiential learning design was a structured activity in which the student consciously engaged in the process of applying knowledge, thought, and logic to the concepts associated with the simulated scenario.

   b) The planning phase for the experiential learning design was a structured, instructor-led process in which the student actively participated in the
development of a concept map, applicable to the simulated patient scenario, prior to engaging in the performing phase.

c) The *performing* phase was a simulation scenario in which the student actively provided patient care to a standardized patient (SP) while being evaluated for performance (using the C-SEI™) and clinical nursing judgment development (using the LCJR).

d) *Debriefing* was a structured activity, immediately following the performing phase, in which the student participated in instructor-guided, self-evaluation of simulation performance and clinical nursing judgment development.

3) Each phase of learning was clearly identified to the learner through changes in environment (i.e., each structured activity will take place in a different area/room).

4) Participants maintained a folder of paperwork that served as verification of their participation in each learning activity and submitted this folder, unaltered, in its entirety, at the completion of the entire simulation process.

5) The sample for the traditional simulation design group was retrieved from an existing database.

6) Historical data was used to obtain clinical nursing judgment development scores of students who have participated in a concrete experience (performing) and reflective observation (debriefing) processes using a traditional simulation design without structured abstract conceptualization (thinking) and active experimentation (planning) activities.

  a) This traditional simulation design group was randomly chosen from a database of historical data, in which LCJR scores for this control group were obtained by the
same raters as in the experimental group, to create a sample size equal to the size of the experimental group.

b) This historical data provided pertinent demographic data for the comparison group.

c) Raters used for LCJR scoring from this historical data in the study had documented inter-rater agreement.

d) Raters who used the LCJR to evaluate clinical nursing judgment development of students in the historical group were the same raters who used the LCJR to evaluate clinical nursing judgment development of students in the experimental group.

(1) These raters had documentation of training on use of the LCJR and evaluation pitfalls and each had 2-5 years of experience using the LCJR to evaluate clinical nursing judgment development in the same clinical scenario that was used for the experimental group.

(2) Inter-rater agreement for each of these raters was analyzed using scores in the existing database and is reported in a table in the results section.

e) The researcher oversaw the collection of historical data and maintenance of the existing database.

f) The students in the database represent the same level of student (first simulation) as the experimental group.

Limitations

This study used a convenience sample of first clinical semester, pre-licensure, baccalaureate, nursing students in northeastern Pennsylvania. The representativeness of
the sample to the population of pre-licensure nursing students across the United States was not known but was examined through reporting of demographics for both the study sample and the baccalaureate nursing student population.

The researcher used the between-group comparison of clinical nursing judgment development in relation to the type of activity used in the thinking and planning phase of this study. The use of historical data for comparison of LCJR scores is a limitation because there is no control of extraneous variables, such as testing environment, for this sample. To control for rater error, raters using the LCJR to evaluate clinical nursing judgment development for the experimental group were the same raters who used the LCJR to evaluate clinical nursing judgment development in the control group. To assess for and report accuracy of LCJR scores, inter-rater agreement was examined and reported for this group of raters using scores available in the historical database. Kappa values with a 95% confidence interval are reported in tables for each of these raters in the results section.

Within-group analysis of simulation performance and clinical nursing judgment development were based on scores collected during the concrete experience of the simulation scenario, or performing phase, for the experimental group. Since numerous raters were used to obtain the data, there was a risk of rater error. To promote accuracy, raters using the C-SEI™ to evaluate simulation performance were trained on the use of the instrument prior to data collection. These raters used the C-SEI™ to evaluate students in the same simulation scenario that was used for the experimental group. These scores were not part of the data collection for this study. Scores obtained during these simulation scenarios were used to analyze inter-rater agreement using Kappa values with a 95%
confidence interval. Inter-rater agreement for each of these raters is reported in a table in the results section.

Measurement of clinical nursing judgment development and simulation performance used the Lasater Clinical Judgment Rubric (LCJR) and the Creighton Simulation Evaluation Instrument (C-SEI™) respectively. While documented psychometric properties for each of these tools is very good, they have both been developed within the last seven years and thus, further documentation of validity and reliability needed to be reported within this study.

While an experimental design with random assignment of students to a control group and intervention group would be ideal, it was not feasible for this study. A quasi-experimental design using historical data collected over a period of two years prior to the intervention was used for the traditional simulation design control group. All efforts were made to report any errors in data that can pose a threat to this study’s validity.

**Significance to Nursing**

There is a lack of investigation in the nursing literature supporting simulation design that fully operationalizes learning theory (Rourke et al., 2010). The results of this study establish evidence related to the effects of a simulation design, based on an experiential learning model, and inclusive of structured pre-simulation thinking and planning activities, on clinical nursing judgment development in pre-licensure, baccalaureate nursing students during their first clinical nursing course. The results of this study explored the relationship between simulation performance and clinical nursing judgment development when an experiential learning design was used to create the simulation experience. The findings of this study will be used to advocate for a theory-
based simulation design that best facilitates the development of clinical nursing judgment in pre-licensure nursing students.

**Summary**

Simulation is an experiential learning process in which clinical nursing judgment development and student performance can be evaluated (Jeffries, 2012). The process of designing and implementing simulated learning experiences is not consistently theory-based (Kaakinen & Arwood, 2009), although various theories, including experiential learning theory, have been modified and adapted for use in traditional simulation design (Lasater, 2007a). In this study, the four elements of Kolb’s experiential learning theory (1999) were applied to create a simulation design that actively engaged the learner in structured activities for four simulation phases: *thinking*, *planning*, *performing*, and *debriefing*.

This study assessed for differences in clinical nursing judgment development in students who participated in a simulation using the traditional simulation design, which used independent, unstructured pre-simulation activities prior to the concrete experience of the simulation scenario (performing phase) and debriefing, and students who participated in a simulation using an experiential learning model design, which used structured, instructor-facilitated activities for thinking and planning prior to the concrete experience of the simulation scenario (or performing phase) and debriefing. This study also analyzed the relationship between clinical nursing judgment development and simulation performance in students who completed the simulation experience designed using Experiential Learning Theory.
Chapter 2

Review of the Literature

This literature review will be presented in two sections. Section one will present the history of simulation and the relationship between simulation and clinical judgment development in nursing. Section two will examine the elements of experiential learning theory that will be used in the study. Section two will include a published manuscript on the difference between critical thinking, clinical reasoning, and clinical judgment.

History of Simulation and Current State of the Science

Morton (1995) defines simulation as the replication of the essential aspects of a clinical situation so that the situation can be readily understood and managed when it occurs in clinical practice. Simulation is a technique that uses a variety of technologies to engage the student in realistic clinical scenarios. In high-fidelity simulations, which attempt to replicate all essential aspects of a clinical scenario, these techniques include high-fidelity manikins, also known as human patient simulators (HPS); and standardized patients (SPs) (Bronander, 2011).

The use of simulation in experiential learning can be traced back to the literature of the 1970s and early 1980s. Dreyfus and Dreyfus (1979) published their research on using simulation to develop emergency response behaviors in aircraft pilots. Further research by Dreyfus and Dreyfus (1980; 1986) reported on how a simulated learning environment can be used to assist learners in acquiring and developing new skill sets, particularly skill sets that require rapid decision-making and judgments. Their findings provided a vital substratum for the science of simulation. Two philosophical principles of their work are assumptions of the pedagogy of simulation in nursing. First, simulation
provides a safe environment for learning with minimal risk to self or others. Second, simulation allows for an opportunity to apply knowledge and reasoning in order to make sound judgments for action.

In the nursing literature, the concept of a relationship between simulation and clinical judgment is first seen in the work of Facione and Facione (1976), who emphasized the importance of identifying observable behaviors in simulated clinical situations in order to link critical thinking with knowledge development and clinical judgment. Their rubric examined thought processes across philosophical disciplines in order to produce a consensus on the concept of critical thinking. Clinical nursing judgment was not defined and the rubric did not provide scoring parameters to objectively measure critical thinking or clinical judgment.

Dincher and Stidger (1976) pilot tested a written simulation format as a means to quantitatively measure clinical nursing judgment. While the pilot test was unsuccessful in demonstrating validity and reliability of this measurement tool, a definition of clinical nursing judgment was proposed. Dincher and Stidger (1976) defined clinical nursing judgment as a “response to multiple simultaneous cues” which results in the “selection of an appropriate nursing intervention” (p. 280) and concluded that there is a need to find evaluative methods using more than a written format to assess the learner’s clinical judgment.

Building on the assumptions of Dreyfus and Dreyfus, Jeffries introduced a theoretical framework for simulation in nursing. Jeffries (2005a) proposed the beginning of an epistemology for simulation in nursing. Jeffries (2005a) identified the integration of simulation into nursing curricula as a meaningful methodology for students to develop
clinical nursing judgment. In 2007, Jeffries and Rogers (2007) introduced The Nursing Education Simulation Framework. This framework illustrated how outcomes are facilitated through the interaction of the three main components of learning: the teacher, the student, and the education practices (Jeffries & Rogers, 2007). This framework also identified and defined five characteristics of simulation design: objectives, fidelity, problem solving, student support, and debriefing (Jeffries & Rogers, 2007).

From 2005 to 2012, studies were released that showed promise for the use of simulation as an effective educational method for developing clinical judgment in nursing students (Rhodes & Curran, 2005; Comer, 2005; Jeffries, 2005a; Jeffries, 2007; Lasater, 2007b; Lasater, 2007a; Bambini et al., 2009; Guhde, 2010; Jeffries, 2012). The evaluation of student performance in simulations should focus on assessing the level of clinical judgment development in the nursing student (Jeffries, 2005a). As noted by Decker, Sportsman, Puettz, and Billings (2008), to support the usefulness of simulation in the development of clinical nursing judgment, studies must employ a valid and reliable tool to measure clinical nursing judgment.

In 2002, the International Nursing Association for Clinical Simulation and Learning (INACSL) was established (INACSL, 2013a). In its early years, much of the focus of INACSL was on establishing the epistemology of simulation in nursing (INACSL, 2013a). The primary work supporting simulation as an experiential learning process is seen in the work of Jeffries (2007; 2012). The Nursing Education Simulation Framework by Jeffries and Rogers (2007) is consistent with the principles of Dreyfus and Dreyfus (1980; 1986) That is, simulation provides a safe environment in which the learner can practice high-risk skills with minimal risk to self or others and, simulation
allows the learner to apply knowledge to a situation through the processes of reasoning in order to make sound judgments for action (Jeffries & Rogers, 2007).

The Nursing Education Simulation Framework proposes three main components of learning: the teacher, the student, and the education practices and the five characteristics of simulation design: objectives, fidelity, problem solving, student support, and debriefing (Jeffries & Rogers, 2007). Exploration of the three components of learning as they relate to simulation is seen in the nursing simulation literature.

Simulation as a safe, non-threatening experiential learning process is supported in studies exploring both the perceptions of faculty (the teachers) and students (the learners), and the educational practices related to simulation (Blum et al., 2010; Cato et al., 2009).

Other research focused on the five characteristics of simulation design: objectives, fidelity, problem solving, student support, and debriefing. These studies explored the tools and techniques used in effective simulation design. For example, to examine the characteristic of fidelity, human patient simulators (HPS) and standardized patients (SPs) were assessed for their effects on learner outcomes and it was determined that the intended outcomes of the simulation should dictate the type of fidelity (Bronander, 2011).

The characteristics of reflective debriefing are also examined in the literature. In their Standards of Best Practice: Simulation, INACSL (2011) identified the reflective debriefing component of simulation as an integral and necessary component of simulation design. Debriefing methods were introduced into the nursing literature to provide standardized approaches to the reflective process of debriefing. Two of the most cited debriefing methods in the nursing literature are Harvard University’s Debriefing Assessment for Simulation in Healthcare (DASH), which focuses on the affective
qualities influencing behaviors and decisions (Simon et al., 2010) and Debriefing for Meaningful Learning, which focuses on concept mapping as a means of evaluating actions and decisions (Mariani, et al., 2012). In simulation design, reflective debriefing takes place immediately following the simulation experience (INACSL, 2011).

As the science of simulation in nursing developed, there was an identified need for measurement tools to be used to evaluate performance, competence, and clinical judgment. Instruments such as the Clark Simulation Evaluation Rubric (Gantt, 2010), the Creighton Simulation Evaluation Instrument (C-SEI™) (Todd et al., 2008), the Seattle University Evaluation Tool (SUET) (Adamson, 2010), and the Lasater Clinical Judgment Rubric (LCJR) (Lasater, 2007a) appeared in the literature, along with several studies examining their validity and reliability (Kardong-Edgren, 2007; Prion, 2008; Ashcraft & Opton, 2009; Lasater & Nielsen, 2009; Kardong-Edgren et al., 2010; Slager & Bartles, 2010; Adamson, 2011; Gubrud-Howe & Sideras, 2011).

The Clark Simulation Evaluation Rubric paired Benner’s (1984) levels of expertise with cognitive, psychomotor, and affective domains and was pilot tested in obstetrical simulations. Inter-rater reliability for the rubric was not established and a conclusion was reached that the rubric may be too subjective or nonspecific (Gantt, 2010).

The Seattle University Evaluation Tool is designed for student self-evaluation. Students score their simulation performance, in collaboration with faculty, from 0 (below expectations) to 5 (exceeds expectations) in five categories: assessment/intervention/evaluation, critical thinking/decision-making, direct patient care, communication/collaboration, and professional behaviors (Adamson, 2010). While there
is one study reporting psychometric properties of the tool (Adamson, 2011), there is no current documented use of the tool in practice.

The Creighton Simulation Evaluation Instrument (C-SEI™) is an Objective Structured Clinical Examination (OSCE) used during the concrete experience of a simulated clinical scenario to evaluate the learner’s ability to meet set objectives (Todd et al., 2008). Performance evaluation is divided into 5 sections: safety, assessment, communication, critical thinking, and technical skills. The C-SEI™ is currently being used in studies exploring evaluation in high-stakes simulations, such as those that may be used to assess readiness for entry into professional nursing practice (Li, 2007). The C-SEI will be used in this study to evaluate student performance in the concrete experience of simulation.

The Lasater Clinical Judgment Rubric (LCJR) is used to evaluate clinical nursing judgment in accordance with Tanner’s Model of Clinical Judgment in Nursing (Lasater, 2007a). The LCJR will be used to measure clinical nursing judgment development in this study. The psychometric properties of the LCJR will be discussed in a manuscript included in Chapter 3. Both the C-SEI and the LCJR will be discussed in more detail in the instrumentation section of Chapter 3.

Simulation has become a widely used experiential learning strategy in pre-licensure nursing education (Berragan, 2011). In recent years, simulation as an experiential learning process was added to core curricula for nursing programs, National League for Nursing (NLN) standards, and American Association of Colleges of Nursing (AACN) Essentials. Despite its inclusion in accrediting guidelines, however, the
processes and design of simulated learning experiences are not consistently theory-based (Kaakinen & Arwood, 2009).

**Experiential Learning Theory**

Simulation is an accepted and expected teaching-learning method in nursing programs (American Association of Colleges of Nursing (AACN), 2008) but only a limited number of theories have been adapted and applied in an attempt to design simulated learning experiences (Lasater, 2007b). Rourke, Schmidt, and Garga (2010) report approximately 45% of articles indexed using the keywords “high fidelity simulation” made no use of theory, and only 10% were categorized as adequately theory-based. A link was recently added to the collections tab of the online journal, *Clinical Simulation in Nursing*, titled *Learning Theory in Simulation* (INACSL, 2013b). Clicking on this link produces a list of only five theory-based research articles.

Through simulation, pre-licensure nursing students are engaged in an experiential learning process with the goal of stimulating cognitive, metacognitive, psychomotor, and affective domains to facilitate the development of clinical nursing judgment and the provision of competent evidence-based practice (Jeffries, 2012). Simulation and clinical nursing judgment development are both experiential learning processes; yet, simulation design in nursing is not fully based on an experiential learning model.

The researcher proposed that a simulation design, based on Kolb’s Model of Experiential Learning, would address all elements of experiential learning, and stimulate all learning domains, including metacognition. The integration of experiential learning theory in simulation design requires two key components. First, all four elements of experiential learning must be included in the phases of the simulation design. Second,
active participation in all phases of the learning/simulation experience is required so the
learner becomes cognizant of each of the elements or phases of the learning processes.
Further discussion supporting the full integration of experiential learning theory examines
both of these key components. Kolb’s Model (see Figure 1) is further explained and an
Experiential Learning Design for Simulation is developed and presented (see Figure 2).
Key terms relative to experiential learning processes and clinical nursing judgment are
defined and analyzed for interrelationships. Metacognition is defined and analyzed for its
relevance to an experiential learning design in simulation.

**Kolb’s model.** In his Theory of Experiential Learning, Kolb (1984; 1999)
presents a model for learning that includes four elements: abstract conceptualization,
active experimentation, concrete experience, and reflective observation. Much of the
literature guiding the science of simulation in nursing uses traditional simulation design,
based on The Nursing Education Simulation Framework, and is focused on evidence that
supports either the techniques for implementing the concrete experience of simulation or
methodologies for facilitating reflection and debriefing. While both the simulation
experience and reflective debriefing are important in experiential learning and clinical
nursing judgment development, the elements of abstract conceptualization (thinking) and
active experimentation (planning) must also be considered.

According to Kolb’s Experiential Learning Theory (Kolb, 1999) knowledge is
created through experience. Conceptualization and planning facilitates the learner’s
decision-making and guides actions in a concrete experience. Reflection is used to
assimilate the experience and create new knowledge. This cycle of learning includes four
phases: abstract conceptualization, active experimentation, concrete experience, and reflective observation (see Figure 1).

![Figure 1. Kolb’s Cycle of Experiential Learning](image)

**Elements of experiential learning design in simulation.** According to Kolb (1984), students have various styles of learning. In a recent study by Robison (2013) there were no statistically significant relationships between these learning styles and clinical nursing judgment development. Robison reports, however, the active experimentation phase had the highest impact on clinical nursing judgment development as measured by the LCJR (Robison, 2013), yet, this is the element consistently omitted from simulation design (Rodgers, 2013).

Kolb’s cyclical approach to knowledge building is mirrored in the processes involved in clinical nursing judgment. According to Tanner (2006), clinical judgment is a process by which nurses apply current knowledge and experience to new circumstances
so they can most effectively interpret a clinical situation. The nurse then makes decisions for actions and modifies approaches based on response to these actions.

This cyclical approach is also mirrored in nursing process. In nursing process, the nurse gathers data and assesses the clinical situation. The nurse then uses clinical reasoning to apply knowledge to the clinical situation in order to make a plan of care. The plan is implemented in a concrete experience and evaluated (Childs, Sepples, & Chambers, 2007).

Kolb’s approach is also mirrored in traditional simulation design based on The Nursing Education Simulation Framework (Jeffries & Rogers, 2007). In this traditional simulation design, the students are provided with some information designed to help them prepare for the simulation experience. These may include written learner objectives and reading assignments but these assignments are not structured and are completed independently (Chase-Cantarini, & Scheese, 2013). There is no phase that strategically promotes students to actively apply knowledge to the scenario to plan for the concrete experience of the simulation scenario (Horn & Carter, 2007). Students are then engaged in the execution of the simulation scenario as a concrete experience after which they evaluate their actions and use reflection to assimilate the experience into new knowledge that will influence future decision-making and actions (Horn & Carter, 2007).

Theoretically, there is alignment between the elements of experiential learning, the domains of learning, the phases of clinical nursing judgment development, and nursing processes. In traditional simulation design, however, one link is missing: the planning phase. An examination of the elements of Kolb’s experiential learning theory as they align with nursing process, Tanner’s conceptual model for clinical nursing
judgment, and simulation design, reveals a gap in simulation design, specific to the planning phase (see Table 1).

Table 1.

*Elements of design based on various models*

<table>
<thead>
<tr>
<th>Model:</th>
<th>Phase/element:</th>
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<tbody>
<tr>
<td><em>Kolb (1999)</em></td>
<td>Abstract Conceptualization</td>
</tr>
<tr>
<td></td>
<td>Active Experimentation</td>
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<td></td>
<td>Concrete Experience</td>
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<td></td>
<td>Reflective Observation</td>
</tr>
<tr>
<td><em>Nursing Process (Childs, Sepples &amp; Chambers, 2007)</em></td>
<td>Assessing</td>
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<tr>
<td></td>
<td>Planning</td>
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<td></td>
<td>Implementing</td>
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<td></td>
<td>Evaluating</td>
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<tr>
<td><em>Tanner (2006)</em></td>
<td>Noticing</td>
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<tr>
<td></td>
<td>Interpreting</td>
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<td></td>
<td>Responding</td>
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<tr>
<td></td>
<td>Reflecting</td>
</tr>
<tr>
<td><em>Traditional Simulation Design (Jeffries &amp; Rogers, 2007)</em></td>
<td>Pre-simulation class or reading</td>
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<tr>
<td></td>
<td>Simulation scenario</td>
</tr>
<tr>
<td></td>
<td>Reflective Debriefing</td>
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Currently, the science of simulation is based on traditional simulation design (Jeffries & Rogers, 2007) and evidence supporting either the techniques for implementing the simulation scenario or methodologies for facilitating reflection and debriefing. A simulation design based fully on experiential learning theory, incorporating four phases of structured activities to address the four elements of experiential learning, including abstract conceptualization and active experimentation, may better facilitate experiential learning and clinical nursing judgment development.

The use of structured activities for conceptualization and experimentation/planning, in addition to the concrete experience and reflective
observation/debriefing, should bring all processes of experiential learning into consciousness for the learner. Active participation in, and consciousness of, each phase of the experiential learning cycle provides the learner with a means to link pre-simulation expectations, concrete simulation experience, and post-simulation reflection. Thus, the learner engages metacognitive processes through active involvement in pre-simulation activities focused on thinking (abstract conceptualization) and planning (active experimentation), and then continues to apply these processes when performing in the concrete experience of a simulation scenario. Immediately following this scenario, the learner is engaged in reflective observation through debriefing. Through reflection on the experience, metacognition is used to build new knowledge for future thinking (abstract conceptualization) and planning (active experimentation). This cyclical simulation design incorporates each element of experiential learning (see Figure 1) into a distinct learning phase (see Figure 2). In simulation design based on experiential learning processes, each phase of learning is distinctly separate, yet interdependent on the other phases (Kolb, 1999).

Kolb (1999) suggests that activities for all phases be structured in a way that brings each phase of learning to awareness for the learner. Kolb (2009) suggests that each phase be conducted in a separate space and that each phase has a time frame associated with it. Simulation design, therefore, needs to consider the time frame for each phase of the learning cycle and the most conducive physical environment for each activity. The time frame, activity, and environment must be clearly communicated to the student for each phase. In the *Experiential Learning Design for Simulation* (see Figure 2), thinking
Critical thinking, clinical reasoning, and clinical judgment. To better understand the elements of experiential learning processes, the terms critical thinking, clinical reasoning, and clinical judgment must first be defined and analyzed for interrelationships. While these terms as often used interchangeably, there are distinct differences in their definitions, and thus, in the way they are incorporated into simulation design. In simulation, the terms critical thinking, clinical reasoning, and clinical judgment are frequently included in outcomes; however, one must first define each of these terms if there is to be validity and reliability in the methods used to develop and evaluate each.
The terms critical thinking, clinical reasoning, and clinical judgment are interrelated concepts. Each represents an important set of processes leading the nurse to sound, evidence-based practice. Critical thinking is the cognitive processes used for analyzing knowledge (Benner, 1984). Clinical reasoning is the cognitive and metacognitive processes used for analyzing knowledge relative to a clinical situation or specific patient (Banning, 2008). Clinical nursing judgment is the cognitive, psychomotor, and affective processes demonstrated through action and behaviors (Benner, 1984). Together, these processes lead to competent nursing practice.

In both education and practice, nurses must demonstrate competency through measurable outcomes. To ensure that measurements of critical thinking, clinical reasoning, and clinical judgment are both valid and reliable, nurses must first differentiate what each of these key processes is and what tools are available for the measurement of each.

**Literature Search Strategy.** To better understand these related concepts, multiple databases and search strategies were used to review the literature. A search for each key term critical thinking, clinical reasoning, and clinical judgment AND nursing was conducted using the CINAHL, PubMed, Academic Search Premier, and the archives of the *Clinical Simulation in Nursing* online journal. Additional definitions were obtained via Google with no year limitations to obtain a sense of non-nursing definitions of these
concepts. An initial search of the key terms critical thinking, clinical reasoning, and clinical judgment yielded more than 10000 results. Because, for this review, the author was interested only in the application of these terms to nursing, “AND nursing” was added to the search criteria. This yielded 3207 publications.

Because of the volume of the data retrieved, a filter to limit sources to English language was added. This decreased the number of publications yielded to 946. Because these data included a large number of poster and presentation abstracts, a filter for full-text articles was added. This reduced the data retrieved to 95 publications. Search findings were scanned for relevancy. Clinical trials using the terms, but not primarily addressing the concepts of, critical thinking, clinical reasoning, and clinical judgment were found in the retrieved data. A filter was added to eliminate clinical trials from the search, which reduced the findings to 29. Three articles dated 1984, 1988, and 1995 were found to be relevant and were accessed for use in this literature review prior to adding a filter for publications within the last 10 years. This final filter yielded 12 additional relevant articles, which were also used in this literature review. Nine of these 12 articles were published within the last 5 years.

**Critical thinking.** According to the Foundation for Critical Thinking (2011), critical thinking is a way of “imposing intellectual standards” in the approach to any subject, content, or problem (p. e1). Critical thinking is a cognitive process used to analyze empirics. It is knowledge-based and is not dependent on the situation at hand, but rather on the knowledge about the subject that the nurse possesses (Benner, 1984). The process of critical thinking is based on evidence and science rather than “assumptions and/or conjectures” (INACSL, 2011).
A thorough literature review by Simpson and Courtney (2002) included an examination of 78 publications on the topic of critical thinking. The publications ranged from Dewey in 1916 to current literature in 2000. The majority of the literature reviewed was published in the 1990s and included a discussion of the tools available as of 2000 to evaluate critical-thinking skills. Their review was based largely on the 1990 Delphi Project by Facione (1976), which concluded that critical thinking is a cognitive process that is not discipline specific.

Simpson and Courtney (2002) noted that instruments being used to evaluate critical thinking, such as the Watson-Glasser Critical Thinking Assessment Tool, California Critical Thinking Test, and UNCG Critical Thinking Skills Evaluation Instrument, were not specific to nursing. In their summary, they recommended development of a tool to measure critical thinking specific to nursing (Simpson & Courtney, 2002). This, however, seems futile because their review noted a consensus in the literature that critical thinking is not discipline specific. Thus, if critical thinking is not discipline specific, the tools noted in this article can be used to evaluate critical thinking as long as validity and reliability for the tool have been established. A discipline-specific tool is not necessary.

**Clinical reasoning.** Simpson and Courtney’s (2002) analysis of critical thinking laid the groundwork for the concept of clinical reasoning. Kuiper and Pesut (2004) noted that critical thinking is one of the key factors in the cognitive processes of clinical reasoning.

Clinical reasoning is defined in practice-based disciplines as the application of critical thinking to the clinical situation (Jones, 1988). In nursing literature, Jones (1988)
defines clinical reasoning as a cognitive process used by healthcare practitioners to address patient issues. According to Benner (1984) clinical reasoning involves synthesis of knowledge and experience, as well as engagement in the social relationships of the caregiving situation. Clinical reasoning requires both a background of scientific knowledge and a general case or a particular instance in which to apply this knowledge (Lapkin et al., 2010). Clinical reasoning refers to a set of cognitive processes used to discern the relevance of the evidence and scientific knowledge as it applies to a particular patient (Simmons, 2009).

A concept analysis by Banning (2008) reviewed and analyzed 71 nursing and non-nursing publications dated 1964 to 2005, with the majority of the literature dated in the late 1990s and early 2000s. Banning’s (2008) analysis (1) identified a consensus that the processes of clinical reasoning are both cognitive and metacognitive, (2) provided a definition of clinical reasoning as the application of knowledge and experience to a clinical situation, and (3) concluded there is a need to develop tools to measure clinical reasoning in nursing practice in order for it to be better understood.

Many of the difficulties surrounding the measurement of clinical reasoning in nursing practice were related to the lack of a definition. This may have been due to the blurring of lines between the defining attributes of critical thinking and clinical reasoning which existed prior to the publication of Banning’s concept analysis of clinical reasoning in 2008.

A search for valid and reliable tools to measure the development of clinical reasoning did not yield any results; however, current literature suggests that the cognitive and metacognitive processes of clinical reasoning can be developed within the practice of
nursing through the use of decision trees and algorithms (Simmons, 2009), thinking aloud (Banning, 2008), and reflective journaling (Lasater, 2011b).

**Clinical judgment.** Alfaro-LeFevre (1995) emphasized the imperativeness of developing both critical thinking and clinical reasoning skills in order to practice sound clinical judgment. In her definition of clinical judgment, Alfaro-LeFevre (1995) suggests clinical judgment is the application of critical thinking in clinical practice. Judgments are necessary for a clinical practice that is based on evidence rather than conjecture (Alfaro-LeFevre, 1995; Benner, 1984).

At first glance, Alfaro-LeFevre’s definition of clinical judgment is no different than the definitions found in the literature for clinical reasoning. Clinical judgment, however, is not limited to cognitive or metacognitive processes. In her conceptual model of Clinical Judgment in Nursing, 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 standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p, 204).

Tanner (2006) also identified 5 assumptions of clinical judgment in nursing. They are (1) clinical judgments are more influenced by what nurses bring to the situation than the objective data about the situation at hand; (2) sound clinical judgment rests to some degree on knowing the patient and his/her typical pattern of responses, as well as an engagement with the patient and his/her concerns; (3) clinical judgments are influenced by the context in which the situation occurs and the culture of the nursing care unit; (4) nurses use a variety of reasoning patterns alone or in combination; and (5) reflection on practice is often triggered by a breakdown in clinical judgment and is critical for the
development of knowledge and improvement in clinical reasoning (p. 205-207).

Tanner’s key concepts of clinical judgment differentiated it from other definitions of clinical judgment and from the concepts of both critical thinking and clinical reasoning. First, Tanner’s definition focuses not only on the cognitive and metacognitive processes of thinking and reasoning, but also on the psychomotor processes of actions and the affective processes of the caregiver. Second, Tanner’s five assumptions take into account not only the knowledge and application to a specific patient, but also the affective aspects of the caregiver and the environment.

Clinical judgment can only be evaluated comprehensively when there are observable behaviors that allow for the evaluation of level of mastery in not only cognitive domains, but also the psychomotor and affective domains (Mariani et al., 2012). The development and evaluation of clinical judgment come not only from observable behaviors but also from self-reflection on these behaviors (Lasater, 2011b).

Clinical judgment encompasses cognitive, psychomotor, and affective skills. Clinical judgment is specific to the individual. It is rooted in actions based on the ability to analyze empirical information in relation to both the specific situation and the aesthetic and reflective aspects of the nurse and the environment of practice. The most comprehensive conceptual framework for defining clinical judgment in nursing and its philosophical underpinnings are presented in Tanner’s Model for Clinical Judgment in Nursing (Tanner, 2006). Tanner’s conceptual model illustrates the subcategories or four aspects of clinical judgment: noticing, interpreting, responding, and reflecting, and discusses the cognitive, psychomotor, and affective aspects of “thinking like a nurse” (p. 204).
The Lasater Clinical Judgment Rubric (LCJR) operationalizes Tanner’s Model of Clinical Judgment in Nursing by further breaking down each of Tanner’s phases of clinical judgment into 11 dimensions (Lasater, 2007a). The rubric provides a consistent language that can be used to evaluate performance within each dimension and categorize it into a developmental phase of beginning, developing, accomplished, or exemplary. The LCJR thus provides a framework for both self-assessment and formal evaluation of clinical judgment development.

Although the LCJR has been shown to be a valid and reliable tool for the assessment of clinical judgment development in nursing students when used in the simulation environment (Adamson, 2011), there is no evidence to suggest it reflects the specific measurement of critical thinking or clinical reasoning. In a study by Mann (2012) using the LCJR and the Assessment Technologies Institute (ATI) Critical Thinking Assessment™ to evaluate clinical judgment and critical thinking before and after simulation, there was no significant relationship established between critical thinking and clinical judgment. The LCJR is designed to evaluate development within the 4 phases of clinical judgment in nursing (Lasater, 2007a) but not the cognitive, metacognitive, psychomotor, and affective skills specifically applied in clinical judgment. Also, the validity and reliability for the LCJR outside the simulation environment and for the evaluation of populations other than nursing students have not been established.

**Summary of differentiation of terms.** The terms critical thinking, clinical reasoning, and clinical judgment are interrelated concepts. Each represents an important set of processes leading the nurse to sound, evidence-based practice.

Critical thinking is the cognitive processes used for analyzing knowledge based
on evidence and science (Foundation for critical thinking, 2011; INACSL, 2011). Critical thinking is a key skill or process integral for clinical reasoning (Kuiper & Pesut, 2004). Critical thinking can be measured through valid and reliable standardized examinations not specific to the discipline of nursing (Simpson & Courtney, 2002).

Critical thinking is a key skill or process integral for clinical reasoning (Kuiper & Pesut, 2004). Critical thinking can be measured through valid and reliable standardized examinations not specific to the discipline of nursing (Simpson & Courtney, 2002).

Clinical reasoning is the cognitive and metacognitive processes used for analyzing knowledge relative to a clinical situation or specific patient (Banning, 2008). Clinical reasoning is a necessary cognitive and metacognitive component of clinical judgment in nursing (Simmons, 2009; Lapkin et al., 2010; Lasater, 2011b). Although there are currently no valid and reliable tools for measurement, clinical reasoning can be developed within the practice of nursing through the use of decision trees and algorithms (Simmons, 2009), thinking aloud (Banning, 2008), and reflective journaling (Lasater, 2011b).

Clinical judgment in nursing is the cognitive, psychomotor, and affective processes demonstrated through action and behaviors within the 4 phases of clinical judgment: noticing, interpreting, responding, and reflecting (Tanner, 2006). Development of clinical judgment in nursing students within its four phases can be evaluated using the LCJR in the simulation environment (Mariani et al., 2012).

Together, application of cognitive, metacognitive, psychomotor, and affective processes leads to sound and competent nursing practice. Although the concepts of critical thinking, clinical reasoning, and clinical judgment are interrelated, there is no one specific way to measure their development, but rather a variety of tools and processes to facilitate and assess their development. Measurable outcomes to assess the development of critical thinking, clinical reasoning, and clinical judgment in nursing can only be
achieved through strategies appropriately designed to individually evaluate each of the processes used by the nurse to analyze (critically think), apply (clinically reason), and act (clinically judge).

**Metacognition.** Experiential learning is dependent on not only the inclusion of all elements of learning, but also on the learner’s awareness of these elements. This awareness of the elements, and strategic application of knowledge within the elements, relies on metacognition (Schraw & Dennison, 1994). According to Schraw and Dennison (1994), metacognition is “the ability to reflect upon, understand, and control one’s learning” (p. 460).

Metacognition is essential for leaning (Kolb & Kolb, 2009). Metacognition is defined as “one’s knowledge concerning one's own cognitive processes or anything related to them” (Flavell, 1979) and is sometimes referred to as knowing about knowing (Metcalfe & Shimamura, 1994) or thinking about thinking (Peirce, 2003). Metacognition requires both cognition and awareness of the processes of cognition and thus, participants need to both be engaged in activities for all phases of the learning process and be aware of their engagement in these processes (Kolb & Kolb, 2009).

Taylor (1999) describes the process of metacognition as the ability to comprehend the situation at hand and to strategically assess knowledge and skills as part of a plan to address the situation efficiently and reliably. While metacognition has been discussed in the nursing literature (Banning, 2008; Simmons, 2009), there is a gap in evidence as to how metacognitive processes can be assimilated into simulation design to further facilitate clinical nursing judgment development. Using traditional simulation design with independent pre-simulation activities may stimulate cognition, but it does not require a
structured or deliberate application of knowledge and thus does not promote awareness of cognition.

Metcalfe and Shimamura (1994) describe metacognition as the ability to know when and how to use strategies for problem solving and learning. And, according to Schraw and Dennison (1994) metacognitive awareness is not a function of intellectual ability and metacognitive skills are not domain specific, but rather consistent across cognitive, psychomotor, and affective domains. Based on this, active participation in all phases of the Experiential Learning Simulation Design (see Figure 2) would engage metacognitive skills in activities primarily designed for the stimulation of cognitive, psychomotor, and affective domains.

In the Learning Way, Kolb (2009) examines the evolution of the experiential learning process with a focus on metacognition. There are two main themes that emerge. First, the recursive cycle of experiential learning relies on metacognitive processes within each element or phase of experiential learning. Second, experiential learning relies on both the processes of learning and one’s consciousness of being a learner. Knowledge is built not only on the concrete experience but on the metacognition involved in planning for, participating in, and reflecting on the experience (Kolb & Kolb, 2009).

Structured activities that stimulate conceptualization, planning, and reflection rely on both cognitive and metacognitive process. In nursing, these metacognitive processes used for problem solving are referred to as clinical reasoning (Banning, 2008). Clinical reasoning is defined in practice-based disciplines as the application of critical thinking to the clinical situation (Jones, 1988).
There is a consistent theme throughout current nursing literature that for metacognitive processes to be stimulated there must be a particular case to which knowledge and concepts can be applied (Banning, 2008; Simmons, 2009). This theme is relevant to simulation. In simulation, the case is a structured simulation scenario and the patient can be either a human patient simulator (HPS) or a standardized patient (SP). To stimulate metacognitive processes, the student should be engaged in structured activities focused on reviewing the specific patient scenario and planning actions based on this scenario prior to engagement in the concrete experience. Keeton, Scheckley, and Griggs (2002) emphasize that it is not the experience that leads to learning but the process of linking the expected outcomes with the explicit outcomes; therefore, pre-simulation activities should be designed to emphasize what is expected for the learner so the expected outcome can be compared to the explicit in the reflection following the simulation experience.

In the current guidelines for simulation (INACSL, 2011), there are standards for designing the simulation and debriefing experiences. No specific methods or tools are endorsed but there are clear guidelines and adherence to these guidelines ensures that simulation design includes both a structured concrete experience and a structured debriefing session. These guidelines, however, do not address techniques to help students actively plan for their simulation experience.

There is an assumption that pre-simulation activities, such as required readings and skill practice, will help the learner prepare adequately for the simulation experience but, there is no literature supporting the effectiveness of these practices. The literature
lacks studies examining the use of experiential learning theory to guide the pre-
simulation component of the experiential learning process.

According to Flavell (1979) experiential learning is best facilitated when the
learner engages metacognitive processes to examine current knowledge and expectations
prior to engaging in action. The metacognitive processes used in reflection may require
time for assimilation before an individual can incorporate them into judgments for future
use (Kolb & Kolb, 2009). Metacognitive processes, while important in reflection, may be
most useful when incorporated into structured activities of the planning phase prior to
engagement in the concrete experience (Kolb & Kolb, 2009). Thus, in the pre-simulation
period, current knowledge and expectations should be deliberately evoked so that the
individual can consciously develop a plan for action. A simulation design that is based on
experiential learning theory and that supports clinical nursing judgment development,
therefore, should incorporate structured activities for all phases of experiential learning,
including conceptualization and planning.

Current literature suggests that the cognitive and metacognitive processes of
clinical reasoning can be developed within the practice of nursing through the use of
decision-trees and algorithms (Simmons, 2009), thinking aloud (Banning, 2008), care
planning or concept mapping (Mariani et al., 2012), and reflective journaling (Lasater,
2011b; Lasater, 2011b). One technique that has been shown to stimulate metacognitive
processes before and after a simulated or actual clinical encounter is concept mapping
(Castellino & Schuster, 2002; Mariani et al., 2012). Concept mapping can be used to
identify the most pertinent nursing diagnosis or problems and to plan short-term and
long-term goals for the client using evidence-based knowledge garnered in the
conceptualization phase (Schuster, 2000). Concept mapping which involves the learner in applying this evidence-based knowledge to the case scenario can provide a structured written activity that stimulates metacognition as the learner plans for the concrete experience (Schuster, 2000).

This cycle of learning is a continuous process with no specific entry or exit point (Kolb, 1999). For this study, the participant entered the cycle at the conceptualization phase. This was done to both evoke and assess the conceptualizations the learner brings to the simulation experiences relative to the simulated scenario. Since metacognition requires both cognition and awareness of the processes of cognition (Schraw & Dennison, 1994), the participants needed to both engage in activities that stimulated learning, and be aware of their engagement in these processes. Using Kolb’s cycle with entry at conceptualization built on the knowledge the learners brought to the simulation experience and assisted the learners to use metacognition to actively analyze concepts as they applied them to a specific situation in the planning phase, so that they could best interpret the situation and respond to it in the concrete experience. Metacognition was also used as the students actively evaluated their actions for effectiveness and modified their conceptualizations for the future through reflective debriefing.

**Summary**

Traditional simulation design is neither consistent with nursing process nor with Tanner’s phases of clinical nursing judgment (see Table 1). While traditional simulation design addresses the process of planning for the concrete experience for the educator (Horn & Carter, 2007), it does not address the processes of planning for the concrete experience for the learner. In accordance with the theoretical underpinning of Kolb’s
Experiential Learning Theory (Kolb, 1984), and consistent with both the steps of nursing process (Childs et al., 2007) and the phases of development of clinical nursing judgment (Tanner, 2006), simulation design must include all phases of learning (Kolb, 1999). It must do so in a way that stimulates metacognition and makes the learner cognizant of one’s own learning process (Kolb & Kolb, 2009).

This research study addressed this gap in current nursing science and practice by creating a new experiential learning simulation design that included structured pre-simulation activities to prepare the students for the concrete experience (see Figure 2). Using this new design, the researcher examined the effects of experiential learning simulation design on clinical nursing judgment development and analyzed the relationship between clinical nursing judgment development and simulation performance.
Chapter 3

Methods

This research study involved the creation of a new experiential learning simulation design, consistent with the elements of Kolb’s Experiential Learning Cycle (Kolb, 1999) in order to address the gap in current nursing science and practice related to pre-simulation preparation of students. The researcher implemented this new design in order to examine the effects of the integration of experiential learning theory in simulation design on clinical nursing judgment development and to analyze the relationship between clinical nursing judgment development and simulation performance.

This chapter presents the research design and hypotheses. The participants and instruments used in this study are discussed and the blueprints for data collection and analysis are explained. This chapter contains a published manuscript reporting psychometric properties of the Lasater Clinical Judgment Rubric currently reported in the literature.

Research Design

This quasi-experimental research design used quantitative methods to test for a difference in clinical nursing judgment development between students who completed a simulation experience using traditional simulation design and students who completed a simulation experience using an experiential learning simulation design. Within the experimental group, this study examined the relationship between clinical nursing judgment development and simulation performance when performing in a simulation designed using the elements of Kolb’s Experiential Learning Model.
Historical data was used to create a sample of students for a control group who completed a simulation experience using traditional simulation design (Group A). Group A served as the control group. To control for confounding variables, the control group was chosen from student data collected within the last two years, during the same clinical nursing course, using the same simulation scenario and debriefing method, and the same LCJR raters as the experimental group. The control group was comprised of participants at the sophomore level in a pre-licensure baccalaureate, nursing program, which one to two years prior, were enrolled in the same course in which the experimental group was enrolled during this study. These participants completed the same clinical scenario for the concrete experience (performing phase) as the experimental group. As previously discussed, the raters who evaluated clinical nursing judgment development using the LCJR in the control group were the same raters who evaluated clinical nursing judgment development using the LCJR in the experimental group. These raters had two to five years of experience using the LCJR in the clinical scenario used in the concrete experience (performing phase) and debriefing phase of the experiential learning simulation design. These raters all had documentation of training prior to using the LCJR to evaluate students in the control group. Inter-rater agreement for this group of raters was assessed and reported using Kappa values with a 95% confidence interval. Kappa values were determined by comparing LCJR scores obtained by each rater to LCJR scores obtained by the researcher in evaluating students who completed the same clinical scenario and debriefing method used in the experimental group. These scores were obtained from the historical database. No additional rater training was conducted for this group prior to evaluation of the experimental group.
While students for this study were specifically chosen because they had no clinical nursing experience, variables such as age and gender were evaluated as potential confounding variables. To assess the need to control for variables that may confound the findings, mean student GPA at the beginning of the first clinical semester was reported and assessed between groups. Findings of these analyses were reported.

The experimental group (Group B) was a convenience sample of current students, who engaged in a simulation experience, based on an experiential learning design, as a mandatory assignment in their nursing fundamentals course. Clinical nursing judgment development was measured in the historical control group and the experimental group using the Lasater Clinical Judgment Rubric (LCJR) during the concrete experience (performing phase) of a simulation scenario and post-simulation debriefing phases. Simulation performance for the students in the experiential learning simulation design group was also evaluated using the Creighton Simulation Evaluation Instrument (C-SEI™).

**Research Questions**

The purpose of this study was to design a simulation experience based on Kolb’s Model of Experiential Learning (Kolb, 1984; 1999) and, using all elements of the experiential learning cycle, examine how this theory-based design affects the development of clinical nursing judgment in pre-licensure, baccalaureate, nursing students. This study answered two research questions:

1. Are there differences in clinical nursing judgment development in pre-licensure, first-clinical-semester, baccalaureate nursing students, as measured by the LCJR in the simulation setting, when simulations are designed using a traditional
approach versus an experiential learning theory?

2. Is there a relationship between clinical nursing judgment development and simulation performance in students who complete a simulation experience designed using Kolb’s Experiential Learning Theory?

The first research question was addressed by testing for differences in clinical nursing judgment development in students who previously completed a simulation experience using a traditional design (Group A) versus students who completed a simulation experience based upon an experiential learning design (Group B). Mean LCJR scores of the control group, who were engaged in the traditional design, and the experimental group, who were engaged in the experiential learning design, were compared to test the null hypothesis that there is no difference in mean LCJR scores between the two groups (Ho: μA = μB).

The second research question was addressed by assessing the relationship between clinical nursing judgment development and simulation performance when students were engaged in simulations based upon an experiential learning design. To assess this relationship, students engaged in a simulation experience using experiential learning design were evaluated for both clinical nursing judgment development and simulation performance using the LCJR and C-SEI™, respectively. LCJR and C-SEI™ scores were analyzed to test the null hypothesis that there is no relationship between clinical nursing judgment development, and simulation performance.

Participants

The sample for this study was pre-licensure, first clinical semester, baccalaureate, nursing students. For the control group (Group A), participants were chosen from an
existing database. This database is the property of Wilkes University School of Nursing, an AACN-accredited school of nursing at a private university in Pennsylvania.

Participants in the control group were students who were engaged in a traditional simulation design to meet course objectives for their first clinical semester in the nursing program. To increase robustness, participants in this group were purposefully chosen from all cases in the database. The participants chosen were those students who completed the traditional simulation experience and were evaluated by the same raters who evaluated the students in the experimental group, beginning with the most recent. The participants chosen for the control group were de-identified to create a new dataset (Group A) equal in size to that of the experimental group (Group B). The target sample size for each group was estimated to be between 70 and 80. The actual group size was 72 for each group.

For the experimental group (Group B), participants were obtained from a convenience sample of students enrolled in their first clinical nursing course at the same school of nursing as the control group (Group A). Participants in the experimental group were students who engaged in an experiential learning simulation design to meet course objectives for their first clinical semester in the nursing program. Restricting the sample to one school and state may have influenced the demographic representation of the population of baccalaureate nursing students at large, but it was necessary for both feasibility and for control of extraneous variables such as program curriculum. Sample demographics, such as age, gender, and ethnicity, were compared between the control and experimental groups and to population demographics for baccalaureate nursing
students throughout the United States. These demographics are reported in a table in Chapter 4.

All participants in the sample were first clinical semester students. This group was chosen to control for nursing experience as a confounding variable: students enrolled in this course have had no past clinical nursing education. For inclusion in this study, the students in Group B were: 1) enrolled in the first clinical semester fundamentals nursing course at the selected institution and 2) participated in all four phases of the simulation experience. Students and their data were excluded from the study if they 1) did not complete all four phases of the simulation experience, or 2) had clinical nursing education in the past. This latter exclusion included students who transferred from another nursing program after completing at least one clinical nursing course.

Instrumentation

The first specific aim of this study was to incorporate experiential learning theory into simulation design in order to assess for a difference in clinical nursing judgment development in pre-licensure baccalaureate nursing students, when simulations were designed using a traditional approach, with independent, unstructured pre-simulation activities versus an experiential learning model with structured, instructor-facilitated, pre-simulation activities. The independent variable was the simulation design, either traditional (for the control group) or experiential learning (for the experimental group). Clinical nursing judgment development, as reported by LCJR scores, was the dependent variable.

The second aim of this study was to incorporate experiential learning theory into simulation design in order to examine the relationship between clinical nursing judgment
development and simulation performance in students who complete simulation experiences designed using an experiential learning model. The variables are clinical nursing judgment development, as reported by LCJR scores, and simulation performance, as reported by C-SEI™ scores, were analyzed for their relationship to each other.

The experiential learning simulation design consisted of four distinct activities. Each activity was designed based on one of the four elements of Kolb’s Experiential Learning Model. The activities were carried out in four distinct phases: thinking, planning, performing, and debriefing. Each phase was structured, instructor-facilitated, and aligned with an element of the Kolb Model.

This new experiential learning model required one additional faculty member to facilitate the pre-simulation activities. It also shifted the student’s pre-simulation preparation time from independent and self-paced to instructor-facilitated and structured. This shift resulted in the requirement of additional space, including a computer lab and conference room. While additional human and physical resources were required in this first clinical simulation, these additional resources are commonly used to prepare for actual clinical experiences. Also, the addition of a structured planning activity shifted discussion of expectations from the debriefing phase to the planning phase, thus shortening the time needed for structured debriefing.

This section will address the elements of the design and how each was structured (See Figure 2). During the concrete experience and reflective debriefing, the students were evaluated using the Lasater Clinical Judgment Rubric (LCJR) and the Creighton Simulation Evaluation Instrument (C-SEI™). This section will also address these two
tools used to measure the variables of clinical nursing judgment development and simulation performance.

**Phases of the Experimental Design.**

**Thinking.** The *thinking* phase addressed the element of *abstract conceptualization* and referred to the phase of simulation design, which attempted to stimulate the learner to apply knowledge, thought, and logic to the concepts associated with the simulation scenario. The *thinking* activity was designed to bring knowledge relative to the simulated patient case to a level of awareness for the student. In the control group, which used traditional simulation design, students were given reading assignments via the course website. It was expected that students would complete these assignments independently, prior to participating in the concrete experience of the simulation scenario. This was the only pre-simulation activity expected of students and there were no processes in place to assure students completed this assignment.

The processes of conceptualization are based on knowledge rather than a clinical situation (P. Benner, 1984). Knowledge can be gained through traditional learning sources and can be measured using multiple-choice test items with a stem, a clear answer, and three or four distractors (Measurements Research Associates, 2009). Multiple-choice items can test recall, interpretation, and problem solving related to a specific concept (Measurements Research Associates, 2009; Oosterhof, 2001). Test items should have a validity of $\geq .85$ and a discriminate index between .40 and 1.0 (Oosterhof, 2001).

Since content related to the concepts relative to the simulation experience was part of the fundamentals course for both groups, additional reading assignments were not given to the participants in the experimental group. For the thinking activity, students in
the experimental group were allotted 15 minutes to engage in a computer-based, multiple-choice quiz with items relative to the simulation content, nursing care of a postoperative patient. The items for this activity were taken from the Lippincott Williams & Wilkins (LWW) test bank since the institution used this service in its program. Each question chosen had a documented validity of $\geq .85$, a difficulty index of 50-80%, and a discriminate index between .40 and 1.0. Since thinking or conceptualization was not directly measured in this study, students were provided with the correct answers for each question, regardless of whether they chose the correct answer or not. Scores, however, were maintained for potential research in the future. Due to the time allotment, the quiz was limited to 10 items. This allowed the student 60-90 seconds for each item, as is recommended in the literature (Oosterhof, 2001). There was a proctor present throughout this activity and students were allowed to ask questions or seek clarification from the proctor once the quiz was completed.

**Planning.** The planning phase addressed the element of active experimentation. The activity for this phase was designed to assist the participant to use clinical reasoning processes in identifying expectations for the concrete experience of the simulation scenario (performing phase) and in creating a plan of care for the standardized patient (SP).

Clinical reasoning requires both a background of scientific knowledge and a general case or a particular instance in which to apply this knowledge (Simmons, 2009; Lapkin et al., 2010). Since planning involves the cognitive and metacognitive processes of clinical reasoning, in which knowledge is applied to a clinical situation (Banning,
the planning activity was designed to engage students in applying knowledge evoked in the conceptualization phase to plan care for the standardized patient (SP).

In the traditional simulation design, the simulated patient’s electronic medical record was available to the student in the pre-simulation phase via the course website using Desire 2 Learn (D2L), a web-based course support program used at Wilkes University. The students were expected to access and review this record independently. There were no processes in place to assure completion of this review. In the experiential learning simulation design group, an instructor presented the planning activity using the patient scenario and the electronic medical record.

Current literature suggests that the cognitive and metacognitive processes of clinical reasoning can be developed within the practice of nursing through the use of decision trees or concept maps (Simmons, 2009); therefore, in the experimental group, the instructor provided the students with a concept map format and assisted the students in identifying their expectations for the concrete experience of the simulated clinical scenario (performing phase) and preparing a plan of care for the SP. Since students in this nursing program used Schuster’s (2002) Concept mapping: A critical thinking approach to care planning, the format for the concept map was taken from this book.

**Performing.** The performing phase addressed Kolb’s element of concrete experience and referred to the phase of simulation design in which the learner engaged in the provision of patient care. The patient scenario used in the performing phase was consistent with the objectives of the nursing fundamentals course (Campbell, 2008; Hale & Ahlschlager, 2010), specifically, the student will 1) demonstrate ability to maintain a safe patient environment at all times, 2) apply knowledge and skills of postoperative care
in the simulated setting, and 3) perform a basic head to toe assessment. Since communication and physical assessment skills were evaluated, this simulation used standardized patients (SPs), humans acting in the patient role using a standardized script to present the patient case.

The clinical scenario used in the performing phase required the provision of nursing care to a SP in a simulated clinical environment. The clinical scenario used was the same for both the control and experimental groups. The scenario was built on basic knowledge of nursing care of the postoperative patient. The scenario was designed to provide opportunities to evaluate the student’s ability to communicate with and assess the patient, to interpret findings, and to consistently maintain a safe environment. The scenario also provided opportunities for the student to demonstrate the technical skills involved in providing daily hygiene, changing a sterile dressing, and completing a basic physical assessment, including vital signs.

During the concrete experience, faculty evaluated the students using the LCJR and the C-SEITM as described in the upcoming sections. The LCJR was used to evaluate clinical nursing judgment development and the C-SEITM was used to evaluate participants in the simulation experience.

**Debriefing.** The debriefing phase addressed Kolb’s element of reflective observation. It referred to the phase of simulation design in which the learner engaged in the evaluation of clinical nursing judgment development and simulation performance, with an instructor, immediately following the performing phase. The debriefing phase allowed the learner to link expected outcomes to actual outcomes and to self-evaluate reasoning and actions in order to further develop clinical nursing judgment.
Debriefing was done immediately following the *performing* phase. In the *debriefing* phase, the student, in collaboration with the faculty, reviewed performance in the concrete experience of the simulation scenario using the language of the LCJR as a guide. The instructors used open-ended questions to gain insight into the students’ perceptions of their clinical nursing judgment development and simulation performance, using language consistent with the 11 dimensions of the LCJR: *focused observation, recognizing deviations from expected patterns, information seeking, prioritizing data, making sense of data, calm confident manner, clear communication, well-planned intervention/flexibility, being skillful, evaluation/self-analysis, and commitment to improvement* (Lasater, 2007a).

The *debriefing* phase was designed to allow students an opportunity to reflect on the experience and actively discuss the cognitive, metacognitive, psychomotor, and affective influence of their decision-making. In this phase, the student was guided in the process of linking expectations from the *planning* phase to the actual outcomes of the simulation scenario from the *performing* phase, and discussing how the experience shaped future decision-making.

**Lasater Clinical Judgment Rubric (LCJR).** To best evaluate clinical nursing judgment development in the pre-licensure, baccalaureate, nursing student, this study used the Lasater Clinical Judgment Rubric. This interval-level scoring rubric is based on Tanner’s Model of Clinical Judgment in Nursing (Lasater, 2007a).

This instrument was chosen as it has the best documented validity and reliability for measuring clinical nursing judgment development, as defined by Tanner (2006). The LCJR was designed for use with groups of students in simulations. Since this study
evaluated each student’s performance individually, inter-rater agreement specific to the raters used in this study was reported using Kappa values. Psychometric properties for this instrument are good to very good but require further investigation and reporting. The following section is taken from a published manuscript [Victor Chmil, J. and Larew, C. (2013). Psychometric properties of the Lasater Clinical Judgment Rubric. *International Journal of Nursing Education Scholarship, 10*(1), 1-8. 

http://www.ncbi.nlm.nih.gov/pubmed/23629461. Copyright @ 2013 DeRuyter. Reprinted with permission. (See Appendix G)].

Accrediting bodies, such as the American Association of Colleges of Nursing (AACN) (2008) and state boards of nursing (NCSBN, 2011), request that nursing programs provide evidence of student development and readiness for entry into professional nursing practice. Clinical judgment is an essential component of student development and readiness for practice, but it has been difficult to evaluate without a valid and reliable tool. While simulation was quickly integrated into nursing curricula as a means of developing and evaluating clinical nursing judgment, there remained a gap related to evaluation. There were tools available to evaluate student performance in the simulation setting but no theory-based methods for the evaluation of clinical nursing judgment. When the Lasater Clinical Judgment Rubric (LCJR) was introduced into the nursing literature in 2007, it had the potential to meet this identified gap.

Based on Tanner’s Model of Clinical Judgment in Nursing (Tanner, 2006), the LCJR was designed to organize nursing actions into Tanner’s four phases of clinical judgment: noticing, interpreting, responding, and reflecting, and to define specific actions in each phase that were typical of developmental phases: beginning, developing, accom-
plished, or exemplary (Lasater, 2007a). Although the rubric was not designed as a measurement tool, nursing educators began using the LCJR to measure learning outcomes.

Since its introduction, the LCJR has been used throughout the simulation community in nursing education. Many of the studies and anecdotal information using the LCJR, however, are not readily available in published academic nursing literature. The purpose of this article is to examine the evidence supporting the reliability and validity of the LCJR for use as a measurement instrument in future research and for application in nursing practice for the measurement of clinical nursing judgment development.

Development of the LCJR. The LCJR was developed in response to an identified need for a standard evaluative language to discuss clinical judgment with students in the simulation setting (Lasater, 2007a). It provides a practical method and common language for evaluating the development of clinical judgment skills of nursing students in the safe environment of clinical simulation and debriefing. The Tanner Clinical Judgment Model is used as a basis for the evaluative language of clinical judgment development.

The LCJR was developed through an exploratory research study using a qualitative–quantitative–qualitative design (Lasater, 2007a). The first qualitative portion used faculty observations of student performance in simulations to identify a common language used to identify specific dimensions within each of Tanner’s phases of clinical judgment. Observations were also used to identify a common language used to categorize specific behaviors within each dimension that were typical of best and worst performance. Best and worst performance indicators were then broken down into four
distinct behavioral categories typical of beginning, developing, accomplished, and exemplary performance within each dimension.

The rubric developed in this first observational phase is divided into Tanner’s four phases of clinical judgment: noticing, interpreting, responding, and reflecting, with each phase subdivided into dimensions (Lasater, 2007a). Within the phase of noticing are three dimensions: focused observation, recognizing deviations from expected patterns, and information seeking. Within the phase of interpreting are two dimensions: prioritizing data and making sense of data. Within the phase of responding are four dimensions: calm confident manner, clear communication, well-planned intervention/ flexibility, and being skillful. Within the phase of reflecting are two dimensions: evaluation/self-analysis and commitment to improvement. Students are ranked in each of the eleven dimensions based on the actions taken in a simulated clinical scenario. Each dimension has four actions, which determine the developmental level of the student as either beginning, developing, accomplished, or exemplary. Each action rated as beginning earns the student 1 point, developing earns 2 points, accomplished earns 3 points, and exemplary earns 4 points. Thus, with a total of eleven dimensions, a total score of 11 indicates that the student’s overall clinical nursing judgment development is beginning. Total scores identify the student’s overall clinical nursing judgment development as 12–22, developing; 23–33, accomplished; 34–44, exemplary (Lasater, 2007a).

In the second phase of the study a quantitative approach was used to pilot-test the LCJR with small groups of entry-level baccalaureate nursing students in clinical simulations (Lasater, 2007a). In this phase, scores were assigned to actions within each dimension in order to identify a developmental level and to assess construct validity and
reliability of the rubric using descriptive statistics and ANOVA. Lasater (2007a) reports there were amendments made to the language of the rubric during this phase of this study. This limited the ability to merge data sets and further reduced the sample size. These changes led to a type I error, lack of data to compare groups, and an inability to support psychometric properties of the rubric. Lasater (2007a), however, emphasizes the rubric’s purpose was not to measure clinical judgment but rather to create a common language for discussion of clinical judgment development. The final phase of the study was a qualitative study using focus groups and a traditional retrospective qualitative analysis to identify themes related to the language of the rubric and Tanner’s Model.

In this study, which pilot tested the LCJR, Lasater (2007a) was unsuccessful in establishing quantitative data related to the construct validity and rater reliability of the instrument, but through the qualitative work, Lasater succeeded in developing a method to categorize clinical nursing judgment development based on observable behaviors and reflective statements by the students. The lack of quantitative data related to the instrument identified a gap in the literature. As a result, further investigation of the tool began.

**Search strategies.** Multiple databases and search strategies were used to review the literature. A search for each key term Lasater Clinical Judgment Rubric OR LCJR was conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Academic Search Premier, and the archives of the Clinical Simulation in Nursing online journal. This initial search of the key term Lasater Clinical Judgment Rubric OR LCJR yielded 10 results, which included the original publication of the Rubric.

Since there was limited information available in academic journals, an additional
search was conducted using Google. The same key terms were used to conduct a Google search. This yielded 653 results. Results were reviewed to eliminate duplicate results within the Google list and against the academic journals. This reduced the results to 138. An advanced search was done within the remaining 138 results using the key terms reliability OR validity. This yielded 65 results. These final results were manually screened for relevance.

The oldest article found was the original publication of the rubric (Lasater, 2007), as discussed in the previous section. All other results were published or posted within the last 6 years.

**Evaluation of the LCJR.** Standards of Best Practice: Simulation (INACSL, 2011) identified criteria for achieving valid and reliable evaluation of student performance and development, including the need for standardized scoring methods. In order for the LCJR to be considered as a standardized scoring method for student evaluation, its validity and reliability must be established. Much of the psychometric analysis of the LCJR, however, is not found in the current published academic nursing literature but rather in online presentations, projects, and dissertations. In this literature review, current data available on the LCJR will be organized in relation to its validity and reliability.

**Reliability.** Currently, there are few articles published in academic peer-reviewed journals on the reliability of the LCJR. There are several reports available from sources such as dissertations and online PowerPoint presentations. These reports (see Table 2) contain statistical data on inter-rater reliability, intra-rater reliability, and internal consistency.

A dissertation by Adamson (2011) reports the most comprehensive data on the
instrument. In her investigation of evaluative methods for simulation, Adamson (2011) reports an inter-rater reliability for the LCJR of 0.889, and intra-rater reliability of 0.908, and an internal consistency of 0.974. While this inter-rater reliability is very good, it is noted that there was a range of 0.402–0.984 among the raters. Inter-rater reliabilities, as assessed by level and percent agreement strategies, are also reported for smaller studies via presentations with online links (Adamson, 2010; Mann, 2010; Gubrud-Howe & Sideras, 2011). These reports contain insufficient details of sample, methods, and limitations. The most recent academic publication of the LCJR’s reliability includes the results of three studies presented in one article: Adamson, who had the largest sample size used intra-class correlation (2,1) with a reported inter-rater reliability of 0.889; Gubrud used the percent agreement strategy with a reported range of inter-rater reliability of 92–96%; Sideras used level of agreement with a reported range of inter-rater reliability of 57–100% (Adamson, Gubrud, Sideras, & Lasater, 2012).

A statistical analysis using Cronbach alpha to evaluate the internal consistency of the overall tool and the four phases of clinical judgment reports an overall internal consistency of 0.95, and internal consistency of each of the phases of 0.88, 0.88, 0.88, and 0.86, respectively (Jensen, 2010). This data are reported in an online PowerPoint presentation through OPUS and are based on a 2010 presentation at the Assessment Institute, Indianapolis, IN. This study examined differences in LCJR scores among students in the associate degree program and students in the baccalaureate program, but there is limited information regarding sample size, methods, and limitations. In a published quasi-experimental study using the LCJR in a criterion-referenced approach, Blum et al., (2010) report an internal consistency of specific dimensions of clinical
judgment of 0.810 and 0.884. This study used the LCJR to examine the self-confidence and clinical competence of entry-level baccalaureate students using high-fidelity manikins. There were no statistically significant results to support the use of high-fidelity manikins in simulation. The researchers reported an acceptable level of internal consistency (>0.80) of 8 of the 11 dimensions of the LCJR (Blum et al., 2010).

Validity. The validity of the LCJR will be discussed in terms of construct validity, convergent validity, and content validity. The construct validity (see Table 3) evaluates the extent to which the LCJR operationalizes the construct of Tanner’s Model of Clinical Judgment in Nursing. In a report by Gubrud-Howe and Sideras (2011) based on a podium presentation at the 11th Annual International Meeting on Simulation in Healthcare (IMSH) and available through the Oregon Health and Science University (OHSU), the construct validity of the LCJR is reported using interclass correlations (z score) in each of the 11 behavioral categories. The researchers report results varying from good to very good dependent on the category, but they concluded more than one instrument may be required for a more comprehensive evaluation of student performance in simulation.

A quantitative analysis using an expert panel review and post hoc factor analysis of the LCJR’s evaluative language as it operationalizes Tanner’s Model of Clinical Judgment is published online (Ashcraft & Opton, 2009). This study of senior baccalaureate nursing students (n = 85) supports the LCJR’s construct validity but suggests expansion of LCJR by two dimensions to include patient safety and sentinel events (Ashcraft & Opton, 2009).
### Table 2.

**Reliability of the LCJR**

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Variables</th>
<th>Framework</th>
<th>Reliability</th>
<th>Sample</th>
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</thead>
</table>
| Adamson (2011)         | Simulation performance evaluation of entry level nursing students          | Dissertation: Criterion referenced statistical analysis to establish psychometrics of currently available simulation performance evaluation | Inter-rater reliability  
Interclass correlations coefficient for inter-rater reliability: ICC (2,1) 95%  
CI = 0.889 (0.402, 0.984)  
Intra-rater reliability  
Interclass correlations coefficient for intra-rater reliability = 0.908  
(0.125, 0.994)  
Internal consistency  
= 0.974 | n = 29 raters | Overall inter-rater and intra-rater reliabilities are very good. Range of reliability is large. Further analysis of both inter-rater and intra-rater reliabilities for the instrument are necessary within the content of future studies. |
Intra-class correlation (2,1) with a reported inter-rater reliability of 0.889%  
agreement strategy  
92–96% level of agreement 57–100% | sample size  
n = 29 174 ratings  
n = 272 ratings  
n = 4 141 ratings | Overall inter-rater reliabilities are very good. Range of reliability is large. Further analysis of the reliabilities for the instrument are necessary within the content of future studies. |
Table 2. Reliability of the LCJR (continued)

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Variables</th>
<th>Framework</th>
<th>Reliability</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blum, Borglund, and Parcells</td>
<td>Self-confidence and clinical competence using specific dimensions of the LCJR</td>
<td>Quasi-experimental Criterion referenced</td>
<td>Internal consistency of 4 LCJR dimensions to define self-confidence with Cronbach alpha = 0.810</td>
<td>Entry-level baccalaureate nursing students (n = 59)</td>
<td>While there were no statistically significant changes in self-confidence and clinical competence using high-fidelity manikins, the study did support the internal consistency of 8 of the 11 dimensions of the LCJR when used in entry-level students in the simulation setting.</td>
</tr>
<tr>
<td>Gubrud Howe and Sideras</td>
<td>11 dimensions of LCJR</td>
<td>Unknown: Online pdf at OHSU based on 2011 INACSL podium presentation of validity and reliability of currently available simulation evaluation tools. Criterion referenced</td>
<td>Inter-rater reliability 0.73, 0.91, 0.85</td>
<td>24 senior level and 22 junior level baccalaureate nursing students (n = 46)</td>
<td>The inter-rater reliability was very good overall.</td>
</tr>
<tr>
<td>Jensen (2010)</td>
<td>LCJR scores in Associate vs Baccalaureate degree nursing students</td>
<td>Unknown: podium presentation from 2010 Assessment Institute (Indianapolis, IN) available online via OPUS on use of the LCJR in a nursing capstone course. Criterion referenced</td>
<td>Internal consistency of LCJR and phases of clinical nursing judgment with Cronbach alpha of 0.95 for overall tool; noticing=0.88; interpreting=0.88; responding=0.88; reflecting=0.86</td>
<td>62 AS nursing students; 26 BS nursing students (n = 88)</td>
<td>No significant differences in LCJR scores between AS and BS nursing students. Provided support for the internal consistency of LCJR when used in entry-level students in simulation setting.</td>
</tr>
</tbody>
</table>
Table 2. *Reliability of the LCJR* (continued)

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Author &amp; Date</th>
<th>Author &amp; Date</th>
<th>Author &amp; Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mann (2010)</td>
<td>critical thinking and clinical judgment</td>
<td>Experimental mixed methods with pre-test–post-test SPSS analysis Criterion referenced</td>
<td>Inter-rater reliability = 0.984</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Convenience sample of level II baccalaureate nursing students at midwest university (no n reported)</td>
</tr>
<tr>
<td>Author &amp; Date</td>
<td>Variables</td>
<td>Framework</td>
<td>Validity</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>Ashcraft and Opton (2009)</td>
<td>11 dimensions of LCJR</td>
<td>Quantitative expert panel review and post hoc factor analysis</td>
<td>Construct validity Quantitative</td>
</tr>
<tr>
<td>Gubrud Howe and Sideras (2011)</td>
<td>11 dimensions of LCJR</td>
<td>Unknown: Online pdf at OHSU based on 2011 INACSL podium presentation of validity and reliability of currently available simulation evaluation tools. Criterion referenced</td>
<td>Construct validity: z scores: Focused observation 0.86, 81%; recognizing deviations 0.76, 78%; information seeking 0.60, 73%; prioritizing data 0.96, 83%; making sense of data 0.93, 83%; calm confident manner 0.66, 75%; clear communication 0.92, 82%; well-planned intervention 0.71, 76%; being skillful 0.87, 81%; evaluation 0.93, 82%; commitment to improve 0.90, 82%</td>
</tr>
</tbody>
</table>
Table 3. *Construct Validity of the LCJR* (continued)

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Variables</th>
<th>Framework</th>
<th>Validity</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jensen (2010)</td>
<td>LCJR scores in AS vs BS nursing students</td>
<td>Unknown: podium presentation from 2010 Assessment Institute (Indianapolis, IN) available online via OPUS on use of the Criterion reference</td>
<td>Construct validity: Internal consistency of LCJR and phases of clinical nursing judgment with Cronbach alpha of 0.95 for overall tool; noticing=0.88; interpreting=0.88; responding=0.88; reflecting=0.86</td>
<td>62 AS nursing students; 26 BS nursing students (n = 88)</td>
<td>While there were no statistically significant differences in LCJR, scores between AS and BS nursing students, the study did support the internal consistency of the LCJR when used in entry-level students in the simulation setting.</td>
</tr>
</tbody>
</table>
Convergent validity. The convergent validity evaluates the degree to which the measurement of clinical judgment is correlated with other measures to which it is theoretically predicted to correlate (Waltz, Strickland, & Lenz, 2010). An experimental, pre-test, post-test, mixed method research design by Mann (2010) used a convenience sample of baccalaureate nursing students from a Midwest nursing program. Spearman’s rho correlation was used to evaluate the strength of the relationship between critical thinking and clinical judgment. The ATI Critical Thinking Exam, which is considered one of the gold standards for critical thinking evaluation, was used as the standard measure for critical thinking. No statistically significant correlation was found but the author notes limitations, such as a small sample size and the inability to use an experimental design with a “no scenario” control group, which impeded quantitative analysis and generalizability of results. No sample size was reported (see Table 4).

Content validity. The content validity (see Table 4) evaluates evidence involving the degree to which the content of the measurement tool matches the content domain associated with the construct (Waltz et al., 2010). The associated domains of knowledge and learning, critical thinking, and confidence have been evaluated in support of the LCJR’s content validity.

Kardong-Edgren, Adamson, and Fitzgerald (2010) conducted an extensive study critiquing 22 evaluation tools. The study involved a group of instrument developers who convened at conferences held by the International Nursing Association for Clinical Simulation and Learning (INACSL) and the Society for Simulation in Healthcare (SSIH) to examine available tool’s ability to provide evaluation in Bloom’s three learning domains: cognitive, psychomotor, and affective (Kardong-Edgren et al., 2010). The
LCRJ was one of the three tools identified as meeting the criteria for measuring learning in all three domains. The researchers concluded that data supporting validity and reliability of each of the tools are necessary (Kardong-Edgren et al., 2010).

Davis and Kimble (2011) conducted a literature review and analysis of simulation evaluation tools. The researchers reported an analysis of six evaluation tools. According to their report, the LCJR is one of the only two available instruments demonstrating the ability to measure and evaluate Bloom’s three learning domains (i.e., cognitive, psychomotor, affective) and six of the eight AACN Baccalaureate Essentials (Davis & Kimble, 2011) (see Table 4).

Carrick and Miehl (2010) of Penn State Erie reported using the LCJR in simulation and debriefing activities resulted in student self-reports of increased confidence and critical thinking, as demonstrated in post-debriefing reflective journaling. This report is found in an online PowerPoint presentation through the Human Patient Simulation Network (HSPN). There is no report of sample, methods, or limitations. Cato et al., (2009) conducted a qualitative study using the LCJR in post-simulation debriefing. They report use of the LCJR in debriefing resulted in deeper and more significant self-evaluation, as evidenced in reflective self-assessment. These two studies provide qualitative support of the content validity of the LCJR in relation to the content domain of confidence associated with the construct of clinical judgment (see Table 4).
### Table 4.

**Convergent and content validity of the LCJR**

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Variables</th>
<th>Framework</th>
<th>Validity</th>
<th>Sample</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrick and Miehl (2010)</td>
<td>Confidence, critical thinking, clinical judgment</td>
<td>PowerPoint presentation via HSPN of qualitative reflective self-assessment study</td>
<td>Content validity</td>
<td>Entry level nursing students (no ( n ) reported)</td>
<td>Students report increased confidence and critical thinking in post-debriefing reflective journaling when using LCJR as an evaluation tool.</td>
</tr>
<tr>
<td>Kardong-Edgren, Adamson and Fitzgerald (2010)</td>
<td>Learning domains (cognitive, psychomotor, affective)</td>
<td>Quantitative analysis of 22 evaluation tools. Criterion referenced</td>
<td>Content validity</td>
<td>22 evaluation tools</td>
<td>The study identified the LCJR as 1 of 3 tools meeting the criteria for its ability to measure students in cognitive, psychomotor, and affective domains.</td>
</tr>
<tr>
<td>Author &amp; Date</td>
<td>Variables</td>
<td>Framework</td>
<td>Validity</td>
<td>Sample</td>
<td>Results</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------</td>
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<td>-------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Davis and Kimble</td>
<td>Simulation evaluation tools, learning domains (cognitive, psychomotor, affective), and AACN Baccalaureate essentials</td>
<td>Literature review and analysis</td>
<td>Content validity</td>
<td>6 evaluation instruments</td>
<td>Analysis reported LCJR has ability to measure and evaluate all three learning domains and 6 of the 8 AACN Baccalaureate Essentials.</td>
</tr>
<tr>
<td>Mann (2010)</td>
<td>Critical thinking and clinical judgment</td>
<td>Experimental mixed methods with pre-test–post-test SPSS analysis. Criterion referenced</td>
<td>Convergent validity: Spearman’s Rho showed no significant relationship in clinical judgment and critical thinking in two groups: 0.163, p = 0.518</td>
<td>Convenience sample of level II baccalaureate nursing students at Midwest university (no n reported)</td>
<td>While there was no statistically significant correlation between critical thinking and clinical judgment.</td>
</tr>
</tbody>
</table>
Summary of LCJR evaluation. It is important to nursing practice and research that we use valid and reliable tools for the evaluation of both students and practicing nurses. In education, the measurement of clinical nursing judgment is a key factor for assessing student progress and their ability to meet program objectives. There is documented feasibility for use of the LCJR to assess student learning in cognitive, psychomotor, and affective domains and to assess ability to meet learning outcomes in accordance with six of the AACN Baccalaureate Essentials.

The content validity of the LCJR as a tool for assessing clinical judgment development, as defined by Tanner’s Model of Clinical Judgment in Nursing, is fairly well established. Currently, the most documented support for the construct of clinical judgment is within the content domain of confidence. Additional research is needed to address the construct and content validity in larger groups examining each of the content domains within the construct. Further research is also needed to evaluate the convergent validity of the tool in relation to the interrelated concepts of critical thinking and clinical reasoning.

Validity and reliability for the LCJR are only reported for undergraduate, pre-licensure, nursing students in the simulation environment. Additional studies are needed to examine the use of this instrument in registered nurses and environments other than a simulation setting. Also, to date, studies using the LCJR for evaluation of clinical judgment development have used a group simulation scenario and debriefing structure. Since simulation is meant to replicate reality, individual simulation scenarios may provide more realistic simulations. Currently, studies investigating differences in findings when the LCJR is used as an evaluation tool in both group and individual simulation
scenarios are also necessary to further investigate the tool’s reliability.

While Adamson (2011) reports a very good inter-rater reliability, the wide range suggests the need for continued rater-reliability testing. To assure inter-rater reliability in future research, extensive training of raters on the use of the LCJR must be conducted prior to data collection and inter-rater reliability must be reported with overall study results. It is suggested that when using the LCJR in practice and presentations, methods and results should be reported for any psychometric data garnered.

**Creighton Simulation Evaluation Instrument (C-SEI™).**

The C-SEI™ is designed based on the Baccalaureate Essentials of the American Association of Colleges of Nursing (AACN) (Todd et al., 2008). The interval level rubric divides performance evaluation into four categories: *assessment, communication, critical thinking,* and *technical skills.* Evaluators score performance criteria specific to the simulation in each category with either a 0, indicating the student did not demonstrate competency, or a 1, indicating the student did demonstrate competency. In this study, the simulation assessed for competency in performance using 22 categorical items. The raw score was adjusted to a percentage for analysis by dividing the raw score by 22, as per the instructions for use of the instrument. Todd and associates (2008) report an inter-rater reliability of 0.844-0.891 for the C-SEI. Adamson (2011) reports inter-rater reliabilities of 0.952 (0.697, 0.993) ICC (2, 1) and 0.883 (-.001, 0.992) ICC (3, 1) at a 95% confidence interval, and an internal consistency with a Cronbach alpha of 0.979. These psychometric properties are based on scoring of groups of students in simulations. Since this study evaluated each student’s performance individually, inter-rater reliability specific to this study was reported using Kappa values.
**Data Collection**

Permissions for this study were obtained through the Institutional Review Boards (IRBs) at Duquesne University, the institution through which the researcher will obtain a PhD, and Wilkes University, the institution where the research was conducted. The researcher obtained consent for use of demographic, historical, and experimental data via access to the school of nursing’s database through the Associate Dean of the School of Nursing at Wilkes University. In accordance with the course syllabus, student participation in the simulation experience was mandatory to meet course objectives. Entering and maintaining records of LCJR and C-SEI scores obtained in simulation in the university’s database was part of school policy for quality improvement and accreditation reporting. The course coordinator for the fundamentals course at Wilkes University, however, met with all students enrolled in the nursing fundamentals course, without the researcher present, to obtain consent for use of their de-identified data for research purposes.

Simulation specialists performed the scoring for the LCJR in this study. These simulation specialists were the same raters who scored clinical nursing judgment development in the control group, using the LCJR. Training for this set of raters was completed prior to collecting data in the control group. Inter-rater agreement scores for each of the raters were calculated using cases in the historical database. LCJR scores obtained through evaluation of students by each rater were compared to LCJR scores obtained through evaluation of the same students by the researcher and are reported in the results section using Kappa values with a 95% confidence interval. Kappa values were
chosen to report inter-rater agreement based on recommendations in the literature for the type of data available (Green & Salkind, 2011).

Faculty and adjunct faculty performed the scoring for the C-SEI™ in this study. The researcher conducted training for this group of raters two months prior to data collection using resources provided by the creators of the C-SEI™. Training was documented accordingly. A group of students participated in the postoperative nursing care simulation two months prior to actual data collection. This group of students was part of neither the control nor the experimental group. Faculty raters and the researcher evaluated students in this group using the C-SEI™. The C-SEI™ scores assigned by each rater for this group of students were compared to the score assigned by the researcher. This inter-rater agreement was reported for each rater using Kappa values with a 95% confidence interval, as recommended in the literature (Green & Salkind, 2011).

LCJR scores, GPA, and demographic information on age, race, and gender for the historical control group was available in the school of nursing’s database. LCJR and C-SEI™ scores, GPA, and demographic information on age, race, and gender for the experimental group, became available at the completion of the first simulation by the students. A data entry clerk removed identifiers, and exported the appropriate variables, including any identified confounding variables, for each case to a new dataset, one for the control group and one for the experimental group. The researcher had access to the new de-identified datasets for analysis using SPSS version 20.0.
Implementation of the Experiential Simulation Design

Each participant in Group B received an instruction packet. This packet included an appointment card for the participant, instructions for completion of the simulation experience, and all applicable forms.

The participants were instructed to arrive in the simulation center at the school of nursing five to fifteen minutes prior to the scheduled appointment. Each participant checked in with the receptionist and was escorted to a computer lab to complete a computer-based, multiple-choice quiz with items relative to the simulation content, nursing care of a postoperative patient. This quiz was taken under the supervision of a proctor, who was permitted to answer questions relative to the quiz content. The participant had 15 minutes to complete the quiz. At the completion of the quiz, the participant printed out a verification of completion and submitted it to the proctor. The proctor signed the results page and placed it in the participant’s packet. This results page served as verification of the participant’s participation in the thinking phase of the experiential simulation design.

The participant then proceeded to a conference room for the planning phase. The participant had 15 minutes with an assigned faculty member prior to proceeding to the performing phase. In this time, the participant and faculty discussed the participant’s expectations for the simulated clinical scenario. The faculty member ensured that each participant had the printed scenario and blank concept mapping form from their packet, and access to the simulated patient’s electronic health record. The faculty reviewed the assigned case and assisted the participant in identifying expectations for the performing phase and in preparing a plan of care for the SP using the concept mapping form. This
concept mapping form was then placed in the participant’s packet as verification of completion of the planning phase of the experiential learning simulation design.

The participant was then led to the simulation room. The performing phase was a simulated clinical scenario based on managing postoperative complications. Since communication and physical assessment skills were evaluated using both the LCJR and the C-SEI™, this simulation used SPs to present the patient case. The participant was given 30 minutes to manage patient care. Two raters scored the simulation. The raters evaluated the participant’s abilities to communicate with and assess the patient, to interpret findings, and to consistently maintain a safe environment. The raters also evaluated the participant’s technical skills as he provided daily hygiene, changed a sterile dressing, and completed a basic physical assessment, including vital signs. The faculty raters evaluated performance using the C-SEI™ and the simulation specialist raters evaluated clinical nursing judgment using the LCJR. The scoring sheet for the C-SEI™ was signed by the rater and placed in the participant’s packet as verification of completion of the performing phase.

After the simulation, the participant engaged in a 30- to 60-minute debriefing phase led by the simulation specialist who rated the participant in the performing phase using the LCJR. The instructor used open-ended questions, such as “what did you notice about the patient” and “was this something you expected to find,” in order to gain insight into the students’ perceptions of their clinical nursing judgment and simulation performance. The rater used language consistent with the 11 dimensions of the LCJR: focused observation, recognizing deviations from expected patterns, information seeking, prioritizing data, making sense of data, calm confident manner, clear communication,
well-planned intervention/flexibility, being skillful, evaluation/self-analysis, and commitment to improvement (Lasater, 2007a). The simulation specialist placed the LCJR scoring sheet in the participant’s packet, as verification of completion of the performing and debriefing phases of the experiential learning design simulation. When finished, the participant returned to the reception area to submit the entire packet to the receptionist.

The receptionist checked all packets for completeness. Once presence and completeness were verified, packets were assigned a case number and given to the data entry clerk for entry into SPSS version 20.0 and for creation of a new datasets.

Data Analysis

All data in the datasets for both the historical control group (Group A) and the experimental group (Group B) were manually screened for missing data and obvious data entry errors, such as scores outside the range of the instrument. All entries for each variable were double-checked by the researcher. Original scoring forms and participant packets were used to verify entries. Descriptive analysis of data, such as mean, median, mode, and range, and frequency distributions were generated using SPSS to further assess for potential entry errors. All statistical tests and descriptive statistics including means, medians, ranges, standard deviations, frequency counts, and proportions, as appropriate, were analyzed using SPSS version 20.0.

Research question one. Are there differences in clinical nursing judgment development in pre-licensure baccalaureate nursing students, as measured by the Lasater Clinical Judgment Rubric (LCJR) in the simulation setting, when simulations are designed using a traditional approach versus an experiential learning model? An independent samples t-test was planned to test the null hypothesis that there is no
difference in mean LCJR scores in students who engage in a simulation experience using traditional design and mean LCJR scores in students who engage in a simulation experience using an experiential learning simulation design. If demographic or other potentially confounding differences between the experimental and historical control groups were identified, an analysis of covariance (ANCOVA) was planned with $\alpha = 0.05$, as is standard in education-based research (Polit & Beck, 2011).

**Sampling.** The sample for the traditional simulation group (Group A) was a sample chosen from historical records made available through Wilkes University’s School of Nursing, which had documented LCJR student scores that were assigned during their first clinical simulation by the same raters who used the LCJR to score the experimental group (Group B). The sample for the experiential learning simulation group (Group B) was a convenience sample of students enrolled in their first clinical nursing course at the same school of nursing. Scores of all students enrolled in the nursing fundamentals course were used in this study and analysis of power was conducted post hoc, as sample size was set based upon enrollment in the course and consent for use of data in the study. There was no pairing between groups, and no participant was a member of more than one group.

For comparison of means, LCJR scores were measured using an interval scale, with a range of 11-44, and compared between the two simulation groups - Group A, the historical or control group with a traditional simulation design experience, and Group B, the experimental group with an experiential learning simulation design experience. Descriptive statistics were used to report the number of cases, mean, the 95% confidence
interval around each mean, standard deviation, standard error, and the range of scores (minimum and maximum) for both of the groups.

**Assumptions for testing differences in means.**

*Normality.* Univariate normality was assessed for the continuous variable, LCJR scores, using visual inspection of histograms, the Kolmogorov-Smirnov test, and kurtosis and skewness values. The assumption of univariate normality was considered met if the distribution of scores was symmetrical, there was an appropriate proportion of distributional height to width, and the Kolmogorov-Smirnov test was $\geq .05$ (Polit & Beck, 2011). The degree of skewness and kurtosis was determined by comparing the numerical value for skewness and kurtosis with twice the standard error of each respectively, and included the range from minus twice the standard error to plus twice the standard error (Polit & Beck, 2011). If the values for skewness and kurtosis fell within the respective range, the assumption of normality was considered not seriously violated (Polit & Beck, 2011). If the assumption of normality was severely violated, the nonparametric analog of the $t$-test, the Mann-Whitney $U$ test was planned in place of the $t$-test (Polit & Beck, 2011).

*Variance.* Homogeneity of variance was assessed using the Levene’s test with $p = .05$ to examine that the variance of the dependent variable (LCJR scores) was the same in both samples. Equal group sizes and a purposeful sampling procedure (to match raters) improved robustness (Polit & Beck, 2011).

*Outliers.* Outliers were identified through analysis of descriptives, frequencies, box plots, and standard residuals. Extreme outliers were identified as those numeric
values that were greater than 3 times the interquartile range (below Q1 or above Q3) (Polit & Beck, 2011).

**Testing statistics.** An independent samples $t$-test was used to test the null hypothesis that there is no difference in mean LCJR scores in students who engaged in a simulation experience using traditional design and mean LCJR scores in students who engaged in a simulation experience using an experiential learning simulation design with $\alpha = .05$. If the assumption of normality was severely violated, however, the nonparametric analog of the $t$-test, the Mann Whitney $U$, would have been used (Waltz et al., 2010; Green & Salkind, 2011). If demographic or other potentially confounding differences between the experimental and historical control groups were identified, analysis of covariance (ANCOVA) would have been used to control for covariates and examine mean difference between groups. Effect size was determined post hoc using *Cohen's d* with a desired power of .80 and $\alpha = .05$(Polit & Beck, 2011).

**Research question two.** Is there a relationship between clinical nursing judgment development and simulation performance in students who complete simulation experiences designed using Experiential Learning Theory? The relationship between clinical nursing judgment development and simulation performance was evaluated using the *Pearson product-moment correlation coefficient*. If the assumption of normality was violated, the nonparametric, *Spearman rho* would have been used (Polit & Beck, 2011). If a relationship between LCJR and C-SEI™ scores for the students in the experiential learning group (Group B) was found to be significant, linear regression analysis of the correlation between the two variables would be employed.
**Sampling.** The sample for the second research question was the experimental group, Group B. This experiential learning simulation group was a convenience sample of students enrolled in their first clinical nursing course at Wilkes University’s School of Nursing. Scores of all consenting students enrolled in the nursing fundamentals course were used to test for a relationship between clinical nursing judgment development and simulation performance. To examine for this relationship, interval scale LCJR scores were compared to interval scale C-SEI™ scores within the experimental group. Analysis of power was conducted post hoc because the sample size of Group B was set based upon the maximum number of students who can be enrolled in the course and their willingness to consent to having their scores used for research purposes.

**Assumptions for testing relationships between variables.**

*Normality and linearity.* Univariate normality was assessed for each of the continuous variables using visual inspection of histograms, the Kolmogorov-Smirnov test, and kurtosis and skewness values. The assumption of univariate normality was considered met if the distribution of scores was symmetrical, there was an appropriate proportion of distributional height to width, and the Kolmogorov-Smirnov test was $\geq .05$ (Polit & Beck, 2011). The degree of skewness and kurtosis was determined by comparing the numerical value for skewness and kurtosis with twice the standard error of each respectively, and included the range from minus twice the standard error to plus twice the standard error (Polit & Beck, 2011). If the values for skewness and kurtosis fell within the respective range, the assumption of normality was considered not seriously violated (Polit & Beck, 2011).
The assumption of linearity was assessed using scatterplots. Linearity was assumed if there was an elliptical pattern indicating the direction of the relationship as positive or negative (Green & Salkind, 2011). Homoscedasticity was assessed for linear regression analysis by examining the shape of the scatterplots of the standardized residual against the standardized predictive values (Green & Salkind, 2011). This assumption was considered met if the variability in LCJR scores was represented with a rectangular plot shape. If the assumption of homoscedasticity was severely violated, outliers would have been removed, the data would have been transformed, as deemed necessary, and appropriate tests would have been run (Polit & Beck, 2011). Results of transformed data analysis were reported in the results.

**Outliers.** Outliers were identified through analysis of descriptives, frequencies, box plots, and standard residuals. Extreme outliers were identified as those numeric values that are greater than 3 times the interquartile range (below Q1 or above Q3) (Polit & Beck, 2011).

**Testing statistic.** The relationship between clinical nursing judgment development and simulation performance was evaluated first for a linear relationship using a scatterplot (Green & Salkind, 2011). If the assumption of bivariate normality was met, the Pearson product-moment correlation coefficient was used to describe the relationship (Green & Salkind, 2011). If the assumption of bivariate normality was violated, however, Spearman's rho would have been used. If a relationship between LCJR scores and C-SEI™ scores for the students in the experiential learning group (Group B) was found to be significant, linear regression analysis of the correlation between the two variables would be done using C-SEI™ scores as the y intercept and LCJR scores as the x intercept.
to determine if clinical nursing judgment development is predictive of simulation performance. The statistical assumptions of regression analysis - normality, linearity, reliability, and homoscedacity – will be assessed for potential violations. The $p$ values and $t$-values will be used to check the significance of the relationship between LCJR scores and C-SEITM scores (Green & Salkind, 2011). Any potential confounding variables will be controlled for in the regression analysis.

**Summary**

This research study was designed to create a new experiential learning simulation design, fully based upon Kolb’s Experiential Learning Cycle. This new experiential learning simulation applied the four elements of Kolb’s experiential learning theory (Kolb, 1999) - *abstract conceptualization, active experimentation, concrete experience,* and *reflective observation* - to create a simulation design that actively engages the learner in structured activities for each of the four simulation phases: *thinking, planning,* *performing,* and *debriefing.*

Using this new design, the effects of the integration of experiential learning theory in simulation design on clinical nursing judgment development, and the relationship between clinical nursing judgment development and simulation performance will be analyzed and reported. This study will use an independent samples $t$-test to test for difference in mean clinical nursing judgment scores between students engaging in traditional versus experiential learning simulation designs (or an ANCOVA as appropriate). *Pearson product-moment correlation coefficient* (or the *Spearman rho* as appropriate) and regression analysis will be used to assess for a relationship between clinical nursing judgment development and simulation performance among the students.
in the experimental group who participate in a simulation experience design based upon an experiential learning model.
Chapter 4

Data Analysis & Results

In this study, the researcher implemented a new simulation design to examine the effects of the integration of experiential learning theory in simulation education on clinical nursing judgment development. This study also analyzed the relationship between clinical nursing judgment development and simulation performance. This chapter presents the results of the study in a full manuscript format.

Abstract

Simulation is an experiential learning process used in nursing education to develop and evaluate competencies, including clinical judgment (Berragan, 2011; Jeffries, 2012), yet the effectiveness of simulation in nursing education is not sufficiently evaluated (Foronda et al., 2013) and simulation design is not adequately theory-based (Kaakinen & Arwood, 2009; Rourke et al., 2010; Jeffries, 2012; Rodgers, 2013). In this study, Kolb’s Model of Experiential Learning (Kolb, 1984; 1999) was employed to create an experiential learning simulation design. A quasi-experimental study was used to test the effects of this new design on clinical nursing judgment development and its relationship to simulation performance. An independent samples t-test showed clinical nursing judgment development of students engaged in a simulation experience using the experiential learning simulation design ($M = 27.81$, $SD = 4.84$) was significantly higher than clinical nursing judgment development of students who were engaged in a traditional design, ($M = 20.75$, $SD = 3.96$), $p < .001$. There was a significant positive correlation between clinical judgment and simulation performance ($r = .69$, $p < .001$) in the experiential learning group. Linear regression analysis showed 47% of the variance in
simulation performance as measured by the C-SEI™ was associated with clinical nursing
judgment development as measured by the LCJR, $R^2 = .467, p < .001$. Findings suggest
that when simulation design is based fully on an experiential learning model, clinical
nursing judgment is more highly developed. This judgment is significantly positively
correlated with enhanced simulation performance.

**Background**

Simulation has become a widely used experiential learning strategy in pre-licensure nursing education (Berragan, 2011). In recent years, simulation as an educational strategy was added to core curricula for nursing programs (AACN, 2005; NCSBN, 2011), National League for Nursing standards (NLNAC Inc., 2013), and American Association of Colleges of Nursing Essentials (AACN, 2008). Through simulation, pre-licensure nursing students are engaged in an experiential learning process with the goal of stimulating cognitive, metacognitive, psychomotor, and affective domains (Banning, 2008; Todd et al., 2008). This experiential learning process incorporates the essential concepts of nursing and nursing process to facilitate the development of clinical nursing judgment and the provision of competent evidence-based practice (Jeffries, 2005a; Jeffries & Rogers, 2007; Jeffries, 2012). Despite the reliance on experiential learning, the pedagogy driving simulation design in nursing is not based fully on experiential learning theory.

Kolb’s Model of Experiential Learning includes four elements – abstract conceptualization, active experimentation, concrete experience, and reflective observation (Kolb, 1999). Of the four elements of experiential learning, active experimentation has the highest impact on clinical nursing judgment development.
(Robison, 2013); yet, the element of active experimentation is consistently omitted from simulation design (Rodgers, 2013). According to Kolb’s Theory (Kolb, 1984; 1999), experiential learning must include all elements and phases of the learning cycle and the learner must be aware of and actively involved in each element or phase.

In traditional simulation design, using The Nursing Education Simulation Framework (Jeffries, 2005a; Jeffries, 2012), the focus of the simulation is on the concrete experience of a simulation scenario and the reflective debriefing that follows the enactment of the scenario. The elements of abstract conceptualization and active experimentation are not included, or they are designed as independent and unstructured activities (Chase-Cantarini & Scheese, 2013). In The Nursing Education Simulation Framework, activities implemented prior to a concrete experience of a simulation scenario are instructor-focused rather than student-focused (Horn & Carter, 2007).

The purposes of this study are to: 1) design a simulation experience based on Kolb’s Model of Experiential Learning; 2) examine how this theory-based design affects the development of clinical nursing judgment in pre-licensure, baccalaureate, nursing students; and 3) describe the relationship between clinical nursing judgment development and student performance when the simulation design is fully based on an experiential learning model.

**Review of the Literature**

In his Theory of Experiential Learning, Kolb (1984; 1999) presents a model for learning that includes four elements: *abstract conceptualization, active experimentation, concrete experience,* and *reflective observation*. Abstract conceptualization involves knowledge and logic (Kolb, 1984). Active experimentation involves the application of
knowledge to a situation to plan interventions (Kolb, 1984). In nursing, the application of knowledge to a clinical situation to plan care is called clinical reasoning (Banning, 2008). Concrete experience is the engagement of the learner in activities and observable behaviors and reflective observation involves self-evaluation that links the expected to the actual outcomes and builds new knowledge (Kolb, 1984).

Much of the literature guiding the science of simulation in nursing uses traditional simulation design, based on The Nursing Education Simulation Framework (Jeffries, 2005a; Jeffries, 2012), and is focused on evidence that supports either the techniques for implementing the concrete experience of a simulation scenario (Horn & Carter, 2007; Childs et al., 2007; Berragan, 2011; Bronander, 2011) or methodologies for facilitating reflective observation and debriefing (Cato et al., 2009; Mariani et al., 2012). There is little to no evidence in the literature supporting structured abstract conceptualization or active experimentation activities in simulation design in nursing yet these are two fundamental components of experiential learning.

According to Kolb’s Experiential Learning Theory (Kolb, 1999) knowledge is created through experience. Conceptualization and experimentation facilitate the learner’s decision-making and guide actions in a concrete experience. Reflection is used to assimilate the experience and create new knowledge. Experiential learning is dependent on not only the inclusion of all elements of learning, but also on the learner’s awareness of these elements (Kolb, 1999). This awareness of the elements, and strategic application of knowledge within the elements, relies on metacognition (Schraw & Dennison, 1994). According to Schraw and Dennison (1994), metacognition is “the ability to reflect upon, understand, and control one’s learning” (p. 460).
Metacognition is an essential component of clinical nursing judgment. 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 standard approaches, or improvise new ones as deemed appropriate by the patient’s response” (p. 204). Clinical judgment can only be developed and assessed when there are observable behaviors that allow for the evaluation of level of mastery in not only cognitive domains, but also in the psychomotor and affective domains (Mariani et al., 2012). Behaviors or actions allow for both evaluation by the instructor and self-evaluation by the student. It is this self-evaluation of reasoning and actions that leads to further development of clinical nursing judgment (Lasater, 2011a; Lasater, 2011b). The Lasater Clinical Judgment Rubric (LCJR) operationalizes Tanner’s Model of Clinical Judgment in Nursing and has documented validity and reliability for measurement within the trajectory of clinical nursing judgment development in pre-licensure nursing students (Adamson, 2011; Adamson et al., 2012).

Since the evaluation of clinical nursing judgment development relies on the observation of behaviors, there may be a link between judgment and performance. The National Council of State Boards of Nursing (NCSBN) uses the term simulation performance to describe the student’s abilities to meet set experiential learning outcomes (Li, 2007). These learning outcomes are designed to evaluate behaviors, competency, safety, communication, and confidence (Li, 2007). The Creighton Simulation Evaluation Instrument (C-SEI™) was designed as an Objective Structured Clinical Examination (OSCE) to evaluate simulation performance in the concrete experience and debriefing of
a simulated clinical scenario (Todd et al., 2008). The C-SEI™ has documented validity and reliability to measure competencies in the simulated environment (Adamson, 2011).

**Methods**

**Research design.** This quasi-experimental research design tested for a difference in clinical nursing judgment development between students who completed a simulation experience using traditional simulation design \(n = 72\) and students who completed a simulation experience using an experiential learning simulation design \(n = 72\). Within the group completing a simulation experience based on the experiential learning simulation design, the relationship between clinical nursing judgment development and competency in simulation performance was also examined.

**Sample.** This study included a convenience sample of first clinical semester, pre-licensure, baccalaureate, nursing students \(N = 144\) from the School of Nursing at Wilkes University, a private university in northeastern Pennsylvania. The sample was derived from both historical data and current students. The historical control group \(n_A = 72\) for this study was created from a database of previous students who completed a simulation experience using a traditional simulation design. Cases chosen were those who were rated by one of the four raters with documented inter-rater agreement for using the LCJR and who would also rate the experimental group. The experimental group \(n_B = 72\) for this study was a convenience sample of students who completed a simulation experience using an experiential learning design as part of their first clinical nursing course of the program. This sample was chosen for feasibility and for control of extraneous variables such as curriculum design, clinical experience, and faculty for the
foundations course, as between group differences in any of these variables could have confounded results.

Group characteristics of age, gender, and ethnicity were compared between the control group and the experimental group. These same group characteristics were also compared between the sample as a whole ($N = 144$) and the target population, which is entry level, baccalaureate nursing students across the United States (see Table 5).

Pearson Chi Square analysis showed no significant difference between the study groups for gender ($p = .835$) and ethnicity ($p = .271$). Fisher’s Exact Test showed no significant difference between groups for age ($p = .690$).

Table 5.

Demographics of group, sample, and population

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Control Group</th>
<th>Experimental Group</th>
<th>Sample</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n_A = 72$</td>
<td>$n_B = 72$</td>
<td>$N = 144$</td>
<td></td>
</tr>
<tr>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td>Gender:</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Male</td>
<td>14</td>
<td>20%</td>
<td>29</td>
<td>20%</td>
</tr>
<tr>
<td>Female</td>
<td>58</td>
<td>81%</td>
<td>57</td>
<td>80%</td>
</tr>
<tr>
<td>Age:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\leq 30$</td>
<td>70</td>
<td>97%</td>
<td>70</td>
<td>97%</td>
</tr>
<tr>
<td>31-40</td>
<td>2</td>
<td>3%</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>$&gt; 40$</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Ethnicity:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>58</td>
<td>81%</td>
<td>62</td>
<td>86%</td>
</tr>
<tr>
<td>Non-White</td>
<td>14</td>
<td>19%</td>
<td>10</td>
<td>14%</td>
</tr>
</tbody>
</table>

Reports by the National League for Nursing (NLN) were used to obtain demographics for the target population (Kaufman, 2010). When compared to the target population, the largest difference between the sample and the target population was with age. The sample was weighted toward the traditional college-aged student, with only 3%
of the sample representing students over the age of 30 compared to 16% in the target population and no representation in the sample of students over the age of 40 compared to 16% in the population (see Table 5).

To assess for academic/classroom performance as a potentially confounding variable, students’ grade point average (GPA) at the beginning of their first clinical nursing semester was examined and compared between groups (see Table 6). Of the students with recorded GPAs, there was no statistically significant difference between the two groups with equal variance assumed, \( t(109) = .314, p = .735 \).

Table 6.

**Between group GPA comparison**

<table>
<thead>
<tr>
<th>Group</th>
<th>( n )</th>
<th>Range</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (A)</td>
<td>54</td>
<td>2.50-4.00</td>
<td>3.14</td>
<td>± .451</td>
</tr>
<tr>
<td>Experimental (B)</td>
<td>57</td>
<td>2.50- 3.95</td>
<td>3.11</td>
<td>± .412</td>
</tr>
</tbody>
</table>

*Note. Since transfer students do not have a recorded institutional GPA at this point in the program, transfer students were not included in the between group comparison.*

Since there were no significant differences in demographics or academic performance between the historical group and the experimental group, the researcher was able to use the historical group as the control group. This between group comparison of demographic characteristics and GPA was also used to assess for variables, which would need to be controlled for in the analysis. There were no covariates identified that required controlling for in the statistical analysis.

**Experiential Learning Simulation Design for this Study.** The Experiential Learning Simulation Design was based on Kolb’s Experiential Learning Model (1999) and two premises of Kolb’s Experiential Learning Theory (Kolb, 1984; 1999). First, for
experiential learning to be most effective, all elements of the learning cycle must be included in the educational experience (Kolb, 1999; Robison, 2013); and second, the learner must be aware of and actively involved in activities for each of the elements (Schraw & Dennison, 1994; Kolb, 1999). The common practice of using unstructured, independent activities before the simulation experience does not adhere to these premises.

The use of structured activities for conceptualization and experimentation, in addition to the concrete experience and reflective debriefing, brings all processes of experiential learning into consciousness for the learner (Kolb, 1999). Active participation in, and consciousness of, each phase of the experiential learning cycle provides the learner with a means to link pre-experience expectations, concrete simulated experience,
and post-experience reflection. The Experiential Learning Simulation Design incorporated each element of experiential learning into a distinctly separate, yet interdependent activity (See Figure 2).

In this new design, thinking addressed the element of abstract conceptualization and referred to the phase of simulation design, which attempted to stimulate the learner to apply knowledge, thought, and logic to the concepts associated with the simulation scenario. For thinking, the traditional simulation design used reading assignments given to the student via the course syllabus and completed by the student independently, one to two weeks prior to the simulation experience. Since content related to the concepts relative to the simulation experience was part of the fundamentals course for both groups, these additional reading assignments were not given to the participants in the experimental group. The experiential simulation design used a structured computer-based activity to actively engage the learner in the process of applying knowledge, thought, and logic to the concepts associated with the simulated scenario (i.e., safety, comfort, infection control) immediately before moving to a planning activity (see Table 7).

The element of active experimentation was addressed through a planning activity, since planning involves the cognitive and metacognitive processes in which knowledge is applied to a clinical situation (Banning, 2008). In this study, planning referred to the phase of simulation design that allowed the learner to apply knowledge of associated concepts to a patient scenario before providing care. In the traditional simulation design, the simulated patient’s electronic medical record was available to the student via the course website using Desire 2 Learn (D2L) and students accessed this record independently, one to two weeks prior to the concrete experience of the simulation.
scenario. The experiential simulation design used a structured, instructor-facilitated activity - the development of a concept map applicable to the simulation scenario, which was completed immediately before the performing phase (see Table 7).

The performing phase addressed Kolb’s element of concrete experience and referred to the phase of simulation design in which the learner engaged in the provision of patient care in a simulated clinical environment. The patient scenario used in the performing phase was consistent with the objectives of the nursing fundamentals course (Campbell, 2008; Hale & Ahlschlager, 2010), specifically, the student will 1) demonstrate ability to maintain a safe patient environment at all times, 2) apply knowledge and skills of postoperative care in the simulated setting, and 3) perform a basic head to toe assessment. Since communication and physical assessment skills were evaluated, this simulation scenario used standardized patients (SPs) - humans acting in the patient role using a standardized script to present the patient case (see Table 7).

Debriefing addresses Kolb’s element of reflective observation. It refers to the phase of simulation design in which the learner engages in the evaluation of clinical nursing judgment and performance, with an instructor, immediately following the concrete experience, or performing phase. The debriefing phase allowed the learner to link expected outcomes to actual outcomes and to self-evaluate reasoning and actions in order to further develop clinical nursing judgment (see Table 7).

Kolb (2009) suggests that each phase be conducted in a separate space and that each phase has a time frame associated with it. The time frame, activity, and environment were clearly communicated to the student for each phase of this design.

Table 7.
## Traditional vs Experiential Simulation Design

<table>
<thead>
<tr>
<th>ELEMENT/PHASE</th>
<th>Traditional Design Group</th>
<th>Experimental Design Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Thinking</strong> (Abstract conceptualization)</td>
<td>Reading assignment independent 1-2 weeks prior</td>
<td>10-point computer based quiz Proctored (15 min.) Immediately before planning</td>
</tr>
<tr>
<td><strong>Planning</strong> (Active experimentation)</td>
<td>Review medical record online Independent 1-2 weeks prior</td>
<td>Concept map Instructor-facilitated (15 min.) Immediately before concrete experience</td>
</tr>
<tr>
<td><strong>Performing</strong> (Concrete experience)</td>
<td>Care of the postop patient (SP) with focus on assessment, safety, and concepts of comfort and infection control (30 min.)</td>
<td>Care of the postop patient (SP) with focus on assessment, safety, and concepts of comfort and infection control (30 min.)</td>
</tr>
<tr>
<td><strong>Debriefing</strong> (Reflective Observation)</td>
<td>LCJR used as guide (30-60 min.) Instructor-facilitated</td>
<td>LCJR used as guide (30-60 min.) Instructor-facilitated</td>
</tr>
</tbody>
</table>

**Note.** Since content related to the concepts relative to the simulation experience was part of the fundamentals course for both groups, the additional reading assignments used for the traditional design group were not given to the participants in the experimental design group.

**Variables.** For the purposes of this study *traditional simulation design* refers to a learning experience based on The Nursing Education Simulation Framework (Jeffries & Rogers, 2007). This traditional simulation design consisted of activities in which learners independently completed unstructured activities for *thinking* and *planning* in the two weeks prior to a 30-minute activity for *performing* and a 30- to 60-minute activity for *debriefing*.

*The experiential simulation design* refers to a learning experience based on Kolb’s Experiential Learning Model, which consisted of structured, instructor-facilitated activities. The experience included a 15-minute *thinking* activity and a 15- minute
planning activity, immediately followed by a 30-minute performing activity, and a 30- to 60- minute debriefing activity.

Clinical nursing judgment development was measured and reported using the LCJR for both the control and experimental groups during the performing and debriefing phases. The LCJR was also used to guide the debriefing session for students in both the traditional and the experiential learning design. LCJR scores reported represent the mean scores of the control and experimental groups. The LCJR is designed to measure clinical nursing judgment development over time (Lasater, 2007a). Since these LCJR scores in this study were obtained in the first clinical simulation of the program, they represent the beginning score of the students’ trajectory of clinical nursing judgment development. The LCJR has a reported inter-rater reliability of 0.889, an intra-rater reliability of 0.908, and an internal consistency of 0.974 (Adamson, 2011). Internal consistency for this study was excellent for the total score (11 items) at Cronbach alpha = .92. Internal consistency was acceptable to good for the categories of noticing (3 items), interpreting (2 items), responding (4 items), and reflecting (2 items), at Cronbach alpha = .88, .90, .89, and .76, respectively.

Simulation performance was measured and reported using the C-SEI™. Performance outcomes for the simulation experience evaluated behaviors, competency, safety, communication, and confidence (Li, 2007). This evaluation was done only in the experimental group, who completed the simulation experience using the experiential simulation design. Todd and associates (2008) report an inter-rater reliability of 0.844-0.891 for the C-SEI™. The inter-rater reliability reported at a 95% confidence interval was 0.952 (0.697, 0.993) ICC (2,1) and 0.883 (-0.001, 0.992) ICC (3,1) and an internal
consistency was reported with a Cronbach alpha of 0.979 (Adamson, 2011). Cronbach's alpha for this study was assessed using the experimental group (n = 72). Since the C-SEI™ is an interval level scoring rubric with only 2 observational categories for each item: 1 = demonstrated competency and 0 = did not demonstrate competency, the standardized alpha value was used to report reliability. The C-SEI™ was found to be highly reliable (22 items; α= .91). Internal consistency for the categories assessment (4 items), communication (5 items), critical thinking (8 items), and technical skills (5 items) were .80, .74, .86, and .83, respectively.

**Data Collection**

Permissions for this study were obtained through the Institutional Review Boards (IRBs) of Wilkes University and Duquesne University. The researcher obtained consent for use of demographic, historical, and experimental data via access to the school of nursing’s database from the Associate Dean of the School of Nursing at Wilkes University. The cases used in this study were de-identified by a data entry clerk, who created new datasets for the researcher’s use in analysis.

In accordance with the course syllabus, student participation in the simulation experience was mandatory to meet course objectives. Entering and maintaining records of LCJR scores in the university’s database was part of school policy for quality improvement and accreditation reporting. However, the course coordinator for the fundamentals course in which the simulation experience was embedded met with all students enrolled in the course, without the researcher present, to obtain consent for use of their de-identified data for research purposes. There were 80 students enrolled, 75 who met eligibility requirements for inclusion, and 72 who consented to participate.
The receptionist checked all student packets for completeness. Once presence and completeness were verified, packets were assigned a case number and given to the data entry clerk who created a de-identified dataset. The researcher had access to the dataset for analysis using SPSS version 20.0.

**Implementation of the experiential learning simulation design.** Current literature supports a simulation design that provides opportunities for individual evaluation (Cook et al., 2013). Individual evaluation of participants in the fundamentals postoperative simulation scenario is the policy and standard practice at the Wilkes University School of Nursing. To adhere to evidence-based practice and to maintain consistency and fidelity for the *performing* and *debriefing* phases, each of the participants in this study was evaluated individually.

Each participant in the experimental group (Group B) received a packet, which included an assigned simulation appointment card for the participant, a graphic of the simulation design, instructions for completion of the simulation experience, and all applicable forms. Packets were distributed to participants one week prior to the simulation experience.

The participants were instructed to arrive in the simulation center at the school of nursing five to fifteen minutes prior to the scheduled appointment. Each participant checked in with the receptionist and was escorted to a computer lab to complete a 10-point, computer-based, multiple-choice quiz with items relative to the simulation content - nursing care of a postoperative patient. Answers and rationale were provided immediately via the computer at completion of the quiz. This quiz was taken under the supervision of a proctor, who was permitted to answer questions relative to the quiz.
content. The participant had 15 minutes to complete the quiz. At the completion of the quiz, the participant printed out a verification of completion and submitted it to the proctor. The proctor signed the results page and placed it in the participant’s packet. This results page served as verification of the participant’s completion of the thinking phase.

The participant then proceeded to a conference room for the planning phase. Each participant had 15 minutes for planning with an assigned faculty member prior to proceeding to the concrete experience of the simulation scenario in the performing phase. In this time, the participant and faculty discussed the participant’s expectations for the performing phase. The faculty member ensured that each participant had the blank concept mapping form from his packet and access to the simulated patient’s electronic health record. The faculty reviewed the assigned case and assisted the participant in identifying expectations for the performing phase and preparing a plan of care for the SP using the concept map. This concept map was then placed in the participant’s packet as verification of completion of the planning phase.

The participant was then instructed to enter the simulation room. In the simulation room, SPs were used to act in the role of a postoperative patient. To maintain fidelity, all SPs followed the same script during the performing phase for all participants. The participant was given 30 minutes to manage patient care in accordance with the course objectives. During the performing phase, two raters evaluated each participant: one using the LCJR and one using the C-SEI™.

Immediately after the performing phase, the participant moved to the control room and engaged in a 30- to 60-minute debriefing. The language of the LCJR was used to guide the debriefing phase. For example, the instructor asked questions such as, “what
did you notice about the patient?” and “how did you interpret that finding?” At the conclusion of the debriefing phase, LCJR and C-SEI™ scores were tabulated and the scoring sheets were placed in the participant’s packet as verification of completion of the performing and debriefing activities. When finished, the participant returned to the reception area to submit the entire packet to the receptionist.

**Measures**

*Inter-rater agreement and internal consistency.* To assess inter-rater agreement within the study, two evaluators per tool would be required. Participants were evaluated using both the LCJR and C-SEI™; thus, four evaluators per participant would be needed. Since four participants completed the simulation experience individually but simultaneously, 16 raters per each 90- to 120-minute interval would have been required. This would have required large amounts of fiscal and human resources. Thus, for feasibility purposes, inter-rater agreement for raters using the LCJR and C-SEI™ was conducted prior to the study in simulations using the same patient scenario. Before data collection, the researcher chose raters who had completed training on the respective instruments. Since four participants would be completing the simulation experience independently but simultaneously, four raters were chosen for each of the two instruments. There were a total of eight raters chosen and identified by rater numbers two through nine. Rater one was the researcher, whose scores were used to assess rater agreement but who would not be rating participants in the study. Raters two through five used the Lasater Clinical Judgment Rubric (LCJR) to rate the participants and raters six through nine used the Creighton Simulation Evaluation Instrument (C-SEI™) (see Tables 8 and 9).
Internal consistency was assessed for both the LCJR and the C-SEI™. Cronbach’s alpha scores were calculated for each instrument specific to the clinical scenario using scores obtained in the *performing* and *debriefing* phases of the simulation experience.

**LCJR.** The LCJR is an interval level scoring rubric with four observational categories for each item: 1 for *beginning*, 2 for *developing*, 3 for *accomplished*, and 4 for *exemplary* (Lasater, 2007a). Raters chosen to evaluate participants using the LCJR all had documented training on the instrument and three to five years of experience with using the LCJR in the postoperative care scenario chosen for use in the concrete experience of the simulation design. For feasibility, historical data was used to examine the LCJR scores of students that were part of neither the control nor the experimental group. These scores were recorded based on student performance in the same clinical scenario used in this study. The researcher compared the LCJR score recorded by the rater to the score assigned by the researcher for that same student. Using the Guidelines for Reporting Reliability and Agreement Studies (GRRAS) it was determined that for a four category rubric, 32 cases were required to determine the Kappa scores for the LCJR (Kottner et al., 2010). Thus, kappa scores were analyzed using 32 cases in the database for each rater. An inter-rater agreement analysis for this set of raters using the Kappa statistic was performed using SPSS version 20.0. Based on the interpretation guidelines by Landis and Koch (1977), the inter-rater agreement for the raters was found to have substantial to almost perfect agreement (see Table 8).

**Table 8.**  
*Kappa values for LCJR raters*
C-SEI™. The C-SEI™ is an interval level scoring rubric with 2 observational categories for each item: 1 = *demonstrated competency* and 0 = *did not demonstrate competency* (Todd et al., 2008). Raters chosen to evaluate participants using the C-SEI™ completed training on the instrument two months prior to data collection using the training materials provided by the creators of the C-SEI™ (Todd et al., 2008). For the training, these raters used the C-SEI to rate students who were part of neither the control nor the experimental group. These scores were recorded based on student performance in the same clinical scenario, which was used in this study. The researcher compared the C-SEI™ score recorded by the rater to the score assigned by the researcher for that same student. Using the Guidelines for Reporting Reliability and Agreement Studies (GRRAS) it was determined that for a two category rubric, eight cases were required to determine the Kappa scores for the C-SEI™ (Kottner et al., 2010). Thus, Kappa scores were analyzed using eight cases in the database for each rater. An inter-rater agreement analysis for this set of raters using the Kappa statistic was performed using SPSS version 20.0. Based on the guidelines for interpretation by Landis and Koch (1977), the inter-rater agreement for the raters was found to have almost perfect agreement (see Table 9). Table 9.

### Kappa values for C-SEI raters

<table>
<thead>
<tr>
<th>Rater Number</th>
<th>Kappa Value</th>
<th>Std. error</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>.840</td>
<td>.141</td>
<td>.564, 1.12</td>
</tr>
<tr>
<td>7</td>
<td>.840</td>
<td>.141</td>
<td>.564, 1.12</td>
</tr>
<tr>
<td>8</td>
<td>.843</td>
<td>.143</td>
<td>.563, 1.11</td>
</tr>
</tbody>
</table>
Data Analysis

All data in the dataset were manually screened for missing data and obvious data entry errors, such as scores outside the range of the instrument. All entries for each variable were double-checked by the researcher. Original scoring forms and participant packets were used to verify entries. Descriptive analysis of data, such as mean, median, mode and range, and frequency distributions were generated using SPSS to further assess for potential entry errors. All statistical tests and descriptive statistics including means, medians, ranges, standard deviations, frequency counts, and proportions, as appropriate, were analyzed using SPSS version 20.0. The independent samples \( t \)-test was planned for comparison of mean scores on the LCJR between groups. The *Pearson product moment correlation coefficient* and linear regressing analysis were planned for analysis of the relationship between clinical nursing judgment development and simulation performance in the experimental group.

**Assumptions for testing differences in means using the independent \( t \)-test.**

**Normality and outliers.** Univariate normality was assessed in each of the two groups for the continuous variable, LCJR scores, using visual inspection of histograms, the Kolmogorov-Smirnov test, and skewness and kurtosis values. Although the Kolmogorov-Smirnov test was significant (\( p = 0.009 \)) in the control group, the assumption of univariate normality was considered not seriously violated since there was an appropriate proportion of distributional height to width (see Figure 3) and the degree of skewness (-.446) and kurtosis (-.345) fell within twice the standard error of each respectively (\( \pm .566; \pm 1.118 \)) (Polit & Beck, 2010).
For the experimental group, the Kolmogorov-Smirnov test was also significant ($p < 0.001$). There was an appropriate proportion of distributional height to width (see Figure 4) but the degree of skewness (-1.077) and kurtosis (1.878) did not fall within twice the standard error ($\pm 0.566; \pm 1.118$). Outliers were removed and normality was reassessed. After adjustment, the degree of skewness (-0.174) and kurtosis (-0.412) did fall within twice the standard error ($\pm 0.410; \pm 0.814$). It is noted, that for a sample size of 144, the $t$-test is robust even with severe violations of the assumption of normality (Polit & Beck, 2011); however, outliers were identified and removed and a sensitivity analysis was run.

Outliers were identified through analysis of descriptives, frequencies, box plots, and standard residuals. There were no extreme outliers identified in the control group, as no numeric values were greater than 3 times the interquartile range (below Q1 or above Q3) (Polit & Beck, 2010). There were four outliers identified in the experimental group, all representing extremely low values. These outliers did not represent erroneous measurements.
Outliers were removed and a sensitivity analysis was run. This resulted in no change in the significance of the findings. In addition to the findings of the sensitivity analysis, there were no identified confounding variables, such as gender, ethnicity, age, or GPA (see Tables 5 and 6), and equal variance was assumed ($p = .643$). Thus, the independent samples $t$-test was performed (Green & Salkind, 2011).

**Variance.** Homogeneity of variance was assessed using the Levene’s test with $\alpha = .05$ to examine that the variance of the dependent variable (LCJR scores) was the same in both samples. Levene’s test for equal variance ($p = .643$) showed that there was equal variability in the two groups.

**Assumptions for testing relationships between variables using the Pearson product moment correlation coefficient.**

**Normality and outliers.** All data were checked for accuracy. There were no missing data.
Outliers were identified through analysis of descriptives, frequencies, box plots, and standard residuals. Extreme outliers were identified as those numeric values that are greater than 3 times the interquartile range (below Q1 or above Q3) (Polit & Beck, 2011). There were four outliers identified in the LCJR scores and three outliers identified in the C-SEI scores (See figure 4), all representing extremely low values. Two outliers were represented by the same cases in each set. Outliers did not represent erroneous measurements.

Bivariate normality was assessed by visual inspection of the P-P Plot of regression standardized residuals between the independent variable (LCJR scores) and the dependent variable (C-SEI™ scores) (see Figure 5). The assumption of bivariate normality was violated. Outliers were removed and residual plots were readjusted. Also, normality of the dependent and independent variables were assessed.
The Q-Q plots of both the independent (LCJR scores) and dependent (C-SEI™ scores) variables were checked to assess univariate normality (See Figure 6). Actual
values lined up along the diagonal that goes from lower left to upper right for both variables.

While the values for skewness and kurtosis for both variables indicated a violation of normality, there was no substantial difference between the mean (27.8) and median (28.0) LCJR scores, or between the mean (87.1) and median (90) C-SEI™ scores. Since outliers were noted, however, sensitivity analysis was run with removal of the outliers, but the sensitivity analysis resulted in no significant change in the findings.

**Findings**

An independent samples *t*-test was conducted with $\alpha = .05$ to test for differences in the mean LCJR scores of students who are engaged in a simulation experience using a traditional simulation design and students who are engaged in a simulation experience using an experiential learning simulation design. The *t*-test was significant, $t(142) = -9.573, p < .001$, with the mean LCJR score of students engaged in the experiential learning simulation design ($M = 27.81, SD = 4.84$) significantly higher than mean LCJR score of students who were engaged in a traditional design ($M = 20.75, SD = 3.96$). A sensitivity analysis was run with removal of the outliers, resulting in no change in the significance, $t(138) = -11.957, p < .001$. A moderate effect size (.63) and power of .95 were determined post hoc using Cohen’s *d* with $\alpha = .05$ (Polit & Beck, 2011).

A linear regression analysis was conducted to examine the relationship between clinical nursing judgment development and simulation performance within the experiential learning simulation design. The scatterplot indicated a linear relationship between clinical nursing judgment development and simulation performance (see Figure 6). The *Pearson product-moment correlation coefficient* was used to determine this
relationship to be positive ($r = .69$) and significant at the 0.001 level ($p < .001$). Linear regression analysis of the correlation between the two variables showed 47% of performance (C-SEI™ score) variance is associated with clinical nursing judgment development (LCJR score) $R^2 = .467$, $F (1,70) = 61.38$, $p < .001$ and $t (70) = 7.84$, $p < .001$. Sensitivity analysis was run with removal of the outliers resulting in no change in the significance, $R^2 = .492$, $F (1,65) = 62.99$, $p < .001$ and $t (65) = 7.94$, $p < .001$.

**Discussion**

The theoretically-based experiential learning simulation design was used in this study to evaluate its effectiveness on clinical nursing judgment development in pre-licensure baccalaureate nursing students. Further analysis was conducted to assess for the relationship between clinical nursing judgment development and performance in the simulated clinical setting when a theoretically-based simulation design is used. Results of this study show significantly higher levels of clinical nursing judgment development in students who completed a simulation experience using an experiential learning design.
when compared to students who completed a simulation experience using a traditional design. Among the students who completed a simulation experience using an experiential learning design, there was a significant, moderately strong, positive relationship between clinical nursing judgment development and simulation performance, with nearly half of the variance in simulation performance variance accounted for by clinical nursing judgment development.

Since the effectiveness of simulation in nursing education is not sufficiently evaluated (Foronda et al., 2013), the findings of this study fill three identified gaps in the nursing simulation literature. First, the new design provides a theoretical framework for a simulation experience fully-based on an experiential learning model. Second, the findings of this study support the use of a theoretically-based simulation design for the development, evaluation, and reporting of clinical nursing judgment development in pre-licensure undergraduate nursing students. Third, the findings of this study support a significant relationship between clinical nursing judgment development and performance in the simulation setting.

**Experiential learning simulation design.** While numerous theoretical and conceptual frameworks have been employed to develop simulation experiences (Rodgers, 2013), currently, simulation design in nursing is not adequately theory-based (Kaakinen & Arwood, 2009; Rourke et al., 2010; P. R. Jeffries, 2012; Rodgers, 2013). Kolb’s Model of Experiential Learning (Kolb, 1984; 1999) provided an appropriate model for a simulation design in which the learner actively engaged in various activities to address all four elements of experiential learning – *abstract conceptualization, active experimentation, concrete experience, and reflective observation*. In current practice, the
element of active experimentation is consistently omitted from simulation design (Rodgers, 2013). In a study by Robison (2013), the four elements of Kolb’s Model were analyzed for their relationship to clinical nursing judgment as measured by the LCJR. Findings of the study suggested inclusion of all four elements in learning. While no individual element was significantly correlated to higher LCJR scores, of the four elements, active experimentation had the highest correlation with clinical nursing judgment development (Robison, 2013).

The experiential learning simulation design utilized in this study adapted Kolb’s Model of Experiential Learning and created a simulation experience that engaged students not only in a concrete experience and reflective observation activity, but also allowed the opportunities for the student to assess knowledge, identify expectations, and plan care through the inclusion of activities that involved abstract conceptualization and active experimentation. This design was also constructed for and used as a method of individually evaluating students in the simulation setting, a practice that is not common in the nursing simulation literature, but is supported in a meta-analysis of simulation design in health care disciplines (Cook et al., 2013). Also, the Institute of Medicine (IOM, 2010) committee, which is examining the future of nursing with a focus on education, calls for the development of new evidence-based educational models to prepare future nurses for practice. This new simulation design is based in theory and evidence and has the potential to provide a new model for experiential learning in nursing students.

Clinical nursing judgment development. Simulation has been described as an experiential learning process used in nursing education to assist in the evaluation of competencies, such as clinical nursing judgment (Berragan, 2011; Jeffries, 2012). The
development and assessment of clinical judgment requires observable behaviors; opportunities for self-reflection on these behaviors (Lasater, 2011a; Lasater, 2011b); and evaluation of level of mastery in cognitive, psychomotor, and affective domains (Mariani et al., 2012). Current literature supports a simulation design that uses a variety of activities and strategies to provide opportunities for learning, as well as employment of these strategies for individual evaluation (Cook et al., 2013). The experiential learning simulation design tested in this study supports current evidence by using four distinct activities – thinking, planning, performing, and debriefing – to stimulate cognitive, metacognitive, psychomotor, and affective learning and provide a means for development of clinical competencies, in particular, clinical nursing judgment. This new design actively engaged the student in activities for each element, providing a strong theoretically-based framework for the execution of a simulation experience that consciously and actively assisted in 1) identifying and applying concepts relative to the case scenario to create a plan of care 2) implementing care in a simulation experience, and 3) self-evaluating to link the expected and the actual outcomes and debrief. These structured activities were shown to more effectively develop clinical nursing judgment than when activities were unstructured and/or independent. The IOM initiatives for the future of nursing recommend innovatively educating future nurses in the processes of thinking and decision-making (IOM, 2010). The results of this study suggest that an experiential learning simulation design, which actively stimulates thinking and decision-making, can improve clinical nursing judgment development in nursing students.

**Clinical judgment and performance.** The IOM committee examining the future of nursing with a focus on education calls for attention to not only knowledge and skills,
but on the competencies of thinking, decision-making, proficient care, and quality improvement necessary for professional formation (IOM, 2010). Simulation design based on experiential learning theory provides an educational strategy to develop these competencies. Consistent with the current description of simulation as a strategy used in nursing education to assist in the development and evaluation of competencies, including clinical nursing judgment (Berragan, 2011; Jeffries, 2012), the findings of this study provide evidence that clinical nursing judgment development of students is significantly higher when experiential learning theory is used in simulation design compared to when a traditional simulation design was used.

Clinical judgment has been identified as an essential skill necessary for development of the expertise required for competent professional nursing practice (Tanner, 2006; Benner, Sutphen, Leonard, & Day, 2010); yet, a relationship has not been established between clinical nursing judgment development and competency in practice. The findings of this study suggest that when an experiential learning design is used for the simulation experience, clinical nursing judgment development and simulation performance are strongly and positively correlated; nearly half of the measured competency in simulation performance was attributed to clinical nursing judgment development.

**Recommendations**

This study successfully created a framework to design a simulation experience for nursing students that was fully based on an experiential learning model. When this design was implemented, clinical nursing judgment development was significantly higher than in students who were engaged in a traditional simulation design. This higher clinical
nursing judgment development was significantly correlated with performance in the simulation setting. However, fiscal and human resources limited the study. Inter-rater agreement for the raters used in the study was very good; however, inter-rater reliability within the study itself was not assessed. To increase sample size, reduce risk of type II error, and control for confounding variables, a convenience sample was used. The sample used was not adequately representative of the population of baccalaureate students in the United States, particularly with regard to age, as there were few non-traditional students in the sample. While results were significant in this study, to control for confounding variables, such as clinical experience, the study focused only on students at the beginning of the trajectory of their clinical nursing judgment development, and did not include students at various points of the trajectory. Thus, these findings can only be generalized to nursing student who are beginning a pre-licensure, baccalaureate, nursing program and who have no previous clinical experience as a student nurse.

An experimental design with random assignment of students to a control group and intervention group would be a more rigorous design. Also, to more fully evaluate the effects of this theory-based design on clinical nursing judgment development, students LCJR scores should be assessed for differences at various points in their learning trajectory.

While this study supported more highly developed clinical nursing judgment and simulation performance prior to beginning clinical practice as a student, evaluation of the experiential simulation design on readiness for entry into professional nursing practice should also be investigated. It is recommended that students are evaluated once they are engaged in the clinical setting using the Creighton Clinical Evaluation Instrument (C-
CEI™) (Todd et al., 2008) and those scores be examined for correlation to LCJR and C-SEI™ scores to further evaluate the relationships between clinical nursing judgment, simulation performance, and actual clinical performance at various stages in their nursing program.

This study presented a new framework for designing a theory-based simulation experience. Using this design, nearly half of the variation in simulation performance was accounted for by clinical nursing judgment development. While knowledge and clinical nursing judgment development can be measured within this new design, the lack of valid and reliable instruments to quantitatively measure the planning phase of the design limits the ability to test the individual components of this model. Since planning involves clinical reasoning, instruments that validly and reliably measure reasoning may allow the design to be more rigorously tested as a model.

Conclusions

This research study was designed to create a new theory-based experiential learning simulation design and test its effect on clinical nursing judgment development in pre-licensure baccalaureate nursing students. This study applied the four elements of Kolb’s experiential learning theory (Kolb, 1999) - abstract conceptualization, active experimentation, concrete experience, and reflective observation - to create a simulation design that focused on nursing concepts and nursing process, and actively engaged the learner in structured activities within each of the four simulation phases: thinking, planning, performing, and debriefing. This simulation experience evaluated students individually in the simulated scenario prior to the onset of practice in the clinical setting.
Findings suggest that engagement of students in an experiential learning simulation design improves clinical nursing judgment among pre-licensure baccalaureate nursing students at the beginning of its trajectory of development. Clinical nursing judgment development accounted for nearly half of simulation performance, as higher LCJR scores were significantly related to higher performance scores. Thus, the use of a simulation design fully based on an experiential learning model better prepared students to perform in the simulation setting than traditional simulation design.


http://eprints.qut.edu.au/263/1/SIMPSON_CRITICAL_THINKING.PDF

www.michigancenterformuning.org/mimages/.../slager_bartles.pdf


doi:10.1097/NNE.0b013e318276dfbe


Appendices
Appendix A

LCJR (A1), Scoring Sheet (A2), and Permission for Use (A3)
## LASER CLINICAL JUDGMENT RUBRIC

**Noticing and Interpreting**

<table>
<thead>
<tr>
<th>Level</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focused Observation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identifies significant patterns and data that are relevant to the patient's situation.</td>
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<tr>
<td><strong>Recognizing Deviations from Expected Patterns</strong></td>
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</tr>
<tr>
<td>Recognizes significant deviations from expected patterns.</td>
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<tr>
<td><strong>Information Seeking</strong></td>
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<td></td>
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</tr>
<tr>
<td>Asks questions to clarify information.</td>
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</tbody>
</table>

**Interpreting**

<table>
<thead>
<tr>
<th>Level</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prioritizing Data</strong></td>
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<tr>
<td>Identifies the most important data and focuses on the patient's needs.</td>
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<tr>
<td><strong>Making Sense of Data</strong></td>
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<tr>
<td>Incorporates relevant information into the patient's situation.</td>
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<tr>
<td><strong>Effective Responding</strong></td>
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</tr>
<tr>
<td><strong>Collaborating</strong></td>
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</tr>
<tr>
<td>Collaborates effectively with the patient and other healthcare providers.</td>
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</tr>
<tr>
<td><strong>Clear Communication</strong></td>
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</tr>
<tr>
<td>Communicates clearly and effectively with the patient.</td>
<td></td>
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</tr>
<tr>
<td><strong>Well-Planned Intervention/Flexibility</strong></td>
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<tr>
<td>Develops and implements a well-structured intervention.</td>
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</tr>
<tr>
<td><strong>Using Skill</strong></td>
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</tr>
<tr>
<td>Demonstrates proficiency in the use of professional skills.</td>
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</tr>
<tr>
<td><strong>Effective Reflecting</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Evaluation of Self</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Evaluates own performance and identifies areas for improvement.</td>
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</tr>
<tr>
<td><strong>Commitment to Improvement</strong></td>
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</tr>
<tr>
<td>Identifies areas for improvement and sets specific goals.</td>
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<td></td>
</tr>
</tbody>
</table>


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Appendix A2

LCJR Scoring Sheet

Lasater Clinical Judgment Rubric Scoring Sheet

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

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Hi Joyce,

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; Lasater, 2011). For measurement purposes, the rubric appears to be most useful with multiple opportunities for clinical judgment vs. one point/patient in time.

Best wishes with your project,

Kathie

Kathie Lasater, EdD, RN, ANEF
Associate Professor
OHSU School of Nursing, SN-4S
3455 SW Veterans’ Hospital Rd.
Portland, OR 97239
503-494-8325
Appendix B

C-SEI (B1) and Permission for Use (B2)
Appendix B1

C-SEI

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSESSMENT</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtain Patient Subjective Data</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Obtain Patient Objective Data</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Perform Follow-Up Assessments as Needed</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Assesses in a Systematic &amp; Orderly Manner (Use the correct technique)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMMUNICATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate Effectively w/Patients (elocution, medical terms, RAP, WNL)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Communicates Effectively w/Patient and S.O. (oral, nonverbal, teaching)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Writes Documentation Clearly, Concisely, &amp; Accurately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responds to Abnormal Findings Appropriately</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provides a Reasonable Professionalism</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CRITICAL THINKING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets Vital Signs (R., P., R.B., F, Pts)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Interprets Lab Results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Formulates Reasonable Priorities Outcomes</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Implements Outcomes/Shares Interventions</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Provides Specific Reasons for Interventions</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Evaluates Interventions and Outcomes</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Reflects on Simulation Experience</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td><strong>TECHNICAL SKILLS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uses Patient Information</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Utilizes Standard Procedures (including handwashing)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Administers Medications Safely</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Manages Equipment, Tubing &amp; Drains Therapeutically</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performs Procedures Correctly</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

*Individual comments on clinical evaluation form*
Appendix B2

Permission for Use of C-SEI

Joyce,
We would be happy to share the instrument with you for use in your research project. I have cc'd Jan Schnack on this e-mail. She will contact you and send you two instruments along with a training CD. The first instrument is our original instrument and the second instrument is the revised instrument that was used by the National Council of State Boards of Nursing for their multi-site simulation study. You are welcome to use either instrument. The training goes with the first instrument but it is explaining a process so you will easily see how it can be adapted for use with the revised instrument. Please let me know if you have any questions after you have had a chance to view the training. Good luck on your dissertation - I am trying to finish up my dissertation as well.

Martha

Martha Todd, MS, APRN-NP
Asst. Professor
Creighton University
School of Nursing
Omaha, NE
402-280-2044
mtodd@creighton.edu
Appendix C

Permission for Use of WU-SON Database

July 13, 2013

To whom it may concern;

As Associate Dean for the School of Nursing at Wilkes University, I grant permission for Joyce Chmil to access the School of Nursing’s database in order to obtain appropriate demographic, historical, and experimental data for analysis in her dissertation research study.

Maryann Merrigan

Maryann Merrigan PhD, RN
Associate Dean, Wilkes University School of Nursing
Maryann.merrigan@wilkes.edu
(570) 408-4074
Appendix D

IRB Approval from Wilkes University (D1) and Duquesne University (D2)
Appendix D1
IRB Approval from Wilkes University

Via E-mail (joyce.chmil@wilkes.edu)
Ms. Joyce Chmil
180 Constitution Avenue
Hanover Township, PA 18706

July 29, 2013

Ms. Chmil

The Wilkes University IRB has reviewed the revisions to your application entitled Effect of an Experiential Learning Model for Simulation Design on Clinical Nursing Judgment Development in Pre-licensure Baccalaureate Nursing Students and found it is exempt from IRB review under U.S. Department of Health and Human Services (HHS) regulations at 45 CFR 46.101(b)(2).

Feel free to contact me at jonathan.ference@wilkes.edu or 570-408-4271 should you have any questions.

Sincerely,

Jonathan D. Ference, Pharm.D., BCPS
Associate Professor, Wilkes University
Nesbitt College of Pharmacy & Nursing
Director of Pharmacotherapy Education
Wilkes-Barre Family Medicine Residency Program
August 13, 2013

Re: Effect of an Experiential Learning Model for Simulation Design on Clinical Nursing Judgment Development in Pre-licensure Baccalaureate Nursing Students – Protocol #13-106

Dr. Turk
School of Nursing
Duquesne University
Pittsburgh PA 15282

Dear Dr. Turk:

Thank you for submitting the research proposal of your student, Joyce Chmil.

Based upon the recommendation of IRB member, Dr. Karen Jakob and my own review, I have determined that your research proposal is consistent with the requirements of the appropriate sections of the 45-CF546.101 and 46.111 on an expedited basis under 45CFR46.110.

The consent form is attached stamped with IRB approval and expiration date. Joyce Chmil should use the stamped form as original for copies that she distributes or displays.

The approval must be renewed in one year as part of the IRB’s continuing review. You will need to submit a progress report to the IRB in response to a questionnaire that we will send. In addition, if the consent form is still in use in one year, it will need to be renewed by our office. In correspondence please refer to the protocol number shown after the title above.

If you and Joyce Chmil propose any changes in procedure or consent process, you must
inform the IRB of those changes and wait for approval before they are implemented. In addition, if any unanticipated problems or adverse effects on subjects are discovered before the annual review, they must be reported to the IRB Chair before proceeding with the study.

When the study is complete, please provide us with a summary, approximately one page. Often the completed study’s Abstract suffices. You or Joyce Chmil should retain a copy of research records, other than those destroyed for confidentiality, over a period of five years after the study’s completion.

Thank you for contributing to Duquesne’s research endeavors.

If you have any questions, feel free to contact me at any time.

Sincerely yours,

Linda M. Goodfellow, PhD, RN
C: Melanie Turk
Joyce Chmil
Karen Jakob
IRB Records
CONSENT TO PARTICIPATE IN A RESEARCH STUDY

TITLE: Effect of an Experiential Learning Model for Simulation Design on Clinical Nursing Judgment Development in Pre-licensure Baccalaureate Nursing Students

INVESTIGATOR: Joyce Chmil, PhD Candidate
84 W. South Street
Wilkes-Barre, PA 18706
(570) 408-4075
Joyce.chmil@wilkes.edu

ADVISOR: (if applicable:) Melanie Turk, PhD, RN
Associate Professor
Duquesne University School of Nursing
Pittsburgh, PA
(412) 396-1817
turkm@duq.edu

SOURCE OF SUPPORT: This study is being performed as partial fulfillment of the requirements for the PhD degree in Nursing at Duquesne University.

PURPOSE: You are being asked to participate in a research project that seeks to investigate the effect of simulation design on clinical nursing judgment development. The simulation in which you will engage is a requirement of NSG210, the nursing foundations course in which you are enrolled for the fall of 2013. Consent to participate in this study will allow your scores from this simulation experience to be used by the researcher once your identifying information is removed.

For this required simulation experience, you will receive an instruction packet. This packet will include your assigned 90-minute simulation appointment card, instructions for completion of the simulation experience, and all applicable forms. You will arrive in the simulation center at the school of nursing five minutes prior to the scheduled appointment and check in with the receptionist who will escort you to a computer lab where you will complete a 10-item, computer-based, multiple-choice quiz with items relative to the simulation content, nursing care of a postoperative patient. This quiz will be taken under the supervision of a proctor. You will have 15 minutes to complete the quiz. At the completion of the quiz, you will print out a verification of completion and submit it to the proctor. The proctor will sign the results page and place it in your packet.
You will then proceed to a conference room for the planning phase. They will have 15 minutes with an assigned faculty member prior to proceeding to the concrete experience. In this time, the faculty will review the assigned case and will assist you in identifying your expectations for the concrete experience and in preparing a plan of care for a Standardized Patient (SP) using the concept mapping form. This concept mapping form will then be placed in your packet at the completion of this exercise. You will then be led to the simulation room. The concrete experience will be a simulation based on managing postoperative complications using a Standardized Patient (SP). You will be evaluated by two raters using both the Lasater Clinical Judgment Rubric (LCJR) and the Creighton Simulation Evaluation Instrument (C-SEI) respectively. You will be given 30 minutes to manage patient care. The scoring sheet for the C-SEI will be signed by the rater and placed in your packet.

After the simulation, you will be engaged in a 30 minute debriefing led by the simulation specialist who rated you using the LCJR. The simulation specialist will place the LCJR scoring sheet in your packet at the end of the debriefing. When finished, you will return to the reception area to submit the entire packet to the receptionist.

The above process is a requirement of NSG210. The use of your de-identified data is the only request that will be made of you for this research study. If you choose not to allow the use of your data, your grade will not be affected and your progression in the nursing program will not be affected.

RISKS AND BENEFITS: There are no risks greater than those encountered in everyday life and those associated with educational activities. The results of the analysis of data, however, may benefit future nursing students. If clinical judgment development is enhanced by the use of an experimental learning simulation design, you may also benefit from this study.

COMPENSATION: There is no compensation for participation. Consent for use of your de-identified information for this project will require no monetary cost to you.

CONFIDENTIALITY: Your name will never appear on any survey or research instruments. No identity will be made in the data analysis. All written materials and consent forms will be stored in a locked file in the researcher's home. Your response(s) will only appear in statistical data summaries. All materials will be destroyed at the completion of the research.

RIGHT TO WITHDRAW: You are under no obligation to participate in this study. If you consent to participate, you may voluntarily withdraw from the study at any time without penalty to your grade or to your ability participate in the simulation.

SUMMARY OF RESULTS: A summary of the results of this research will be supplied to you, at no cost, upon request.

VOLUNTARY CONSENT: I have read the above statements and understand what is being requested of me. I also understand that my participation is voluntary and that I am free to withdraw my consent at any time, for any reason. On these terms, I certify that I am willing to participate in this research project. I understand that should I have any further questions about my participation in this study, I may call Joyce Chmil @ 570-408-4075; Dr. Melanie Turk @ (412) 396-1817, and Dr. Linda Goodfellow, Chair of the Duquesne University Institutional Review Board (412) 396-6548.

Participant's Signature ___________________ Date ___________________

Researcher's Signature ___________________ Date ___________________

Duquesne University
IRB - Protocol 13-106
Approval Date: August 13, 2013
Renewal Date: August 13, 2014
Appendix F

Permission for Inclusion of Published Manuscript in Dissertation Format

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Appendix G

Consent for Inclusion of Published Manuscript in Dissertation Format

DE G

Copyright Agreement

Obligations of the Author/Editor
The Author/Editor warrants that a) Author is the Author of the Article or, if Editor, Editor has properly and irrevocably acquired without restriction any and all rights in and to the Article to the extent as stated in clause 2.1.; b) Author/Editor is entitled without restriction to grant such rights to the Publisher; c) the Article is not libelous and does not infringe on any copyrights, performing rights, trademark rights, personal rights or any other third party rights or is otherwise unlawful; and d) the Article or substantial parts thereof have not been published elsewhere.

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