

HIGH-FIDELITY SIMULATION INFLUENCES ON NOVICE BACCALAUREATE  
NURSING STUDENTS

by

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HIGH-FIDELITY SIMULATION INFLUENCES ON NOVICE  
BACCALAUREATE NURSING STUDENTS

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## ABSTRACT

Current research supports high-fidelity simulation use as a method for educating junior and senior nursing students. The purpose of this study was to examine the relationship that existed between the use of evidence-based high-fidelity simulation and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. A four-year university that offered a Bachelor of Science degree in nursing was the site of the study. This quasi-experimental quantitative study used a simple interrupted time-series, nonequivalent dependent variables, within-group design. Novice baccalaureate nursing students enrolled in their first theory and clinical course comprised the convenience sample. A pretest-posttest assessed their nursing knowledge; the National League of Nursing Questionnaires evaluated the students' perspective of critical thinking skills, performance skills, and self-confidence. The Creighton Simulation Evaluation Instrument evaluated the students' performance skills, critical thinking skills, and self-confidence from the faculty perspective. A paired *t*-test correlated the data results of the NLN Questionnaires and the Creighton Simulation Evaluation Instrument. From the students' perspective the results indicated no direct relationship between high-fidelity simulation and nursing knowledge, skills, critical thinking, and self-confidence. From the faculty perspective the results did suggest that high-fidelity simulation may influence the novice baccalaureate nursing students' performance skills and critical thinking skills. Additional research is needed to support high-fidelity simulation as an education method that influences the development of nursing knowledge, performance skills, critical thinking skills, and self-confidence in novice baccalaureate nursing students.

## DEDICATION

This dissertation is dedicated to my late husband who encouraged me to pursue my dream of furthering my education in nursing; I wish he could be with me at the end of this journey. Also to my daughter and her family who understood my absences from family gatherings or school programs; and my two sons and their families for their encouragement by long distance through this journey.

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## Chapter 1

### Introduction

Nursing education programs use local health care institutions for clinical instruction. The changing health care delivery system limits the availability of clinical experiences for baccalaureate nursing students. They apply their learned knowledge and practice hands-on skills in acute care settings where the patient census is down, and the length of stay is short (Lasater, 2007). Baccalaureate nursing students in clinical settings are delivering care to patients with similar diagnoses and symptoms (Blum, Borglund, & Parcels, 2010). The low patient census presents with too few patients for the number of students in the clinical setting, resulting in the students working together to deliver nursing care. The baccalaureate nursing students are not given an individual experience in the use of learned nursing knowledge and performance skills in the clinical setting (Lasater, 2007). Research shows that simulation use in nursing education is gaining reliability and validity for teaching. Upper-level students advance hands-on performance skills and develop critical thinking skills (Davis, Kimble, & Gumby, 2014; Sideras et al., 2011). Simulation increases the students' self-confidence and increases their nursing knowledge (Blum et al., 2010). Before the change in health care delivery, nursing students took care of patients with a variety of medical diagnoses, these experiences are now limited (Lasater, 2007).

### **Background**

Nursing educators have searched for educational methods including lecture, laboratory, and clinical to assist nursing students in learning. Simulation has taken many forms over the years and incorporated into nursing students' education. Those include

anatomical models circa 1913, task trainers circa 1910, games, role playing, standardized patients, computer-assisted instruction circa 1986, virtual reality, and low-fidelity simulations circa the 1990s. High-fidelity simulation (HFS) use began in 2000 as a new education model for nursing. As the numbers of nursing students have increased, and the number of clinical sites decreased; nursing faculty have felt the need to use simulation in the laboratory setting to provide the experiences that mimic patient care in the clinical settings (Nehring & Lashley, 2009). Published nursing research studies started in 2001 and by 2009 research studies were being published that included articles dealing with HFS use for nursing education.

The last 10 years has resulted in improvement in computer technology to simulators that permit students to witness the outcomes of their interventions. High-fidelity simulation allows access to a variety of scenarios with patients and disease processes that add to the students' knowledge that coordinate with theory learning. Novice baccalaureate nursing students make the connection between interventions and outcomes during their clinical experience exposure to patients (Gates, Parr, & Huguen, 2012; Jeffries, 2009).

Medical-surgical nursing students, pediatric students, obstetrics students, and anesthesia students have participated in HFS research; research conducted with novice nursing students is limited. Educators have begun to consider the implications of using simulation experiences with novice nursing students, defining a novice nursing student as a student enrolled in the first clinical nursing course in a baccalaureate curriculum. The gap in this research is starting to be filled; researchers are developing best practice

scenarios to educate novice nursing students (Bremner, Aduddell, Bennett, & VanGeest, 2006; Jeffries, 2009).

### **Problem Statement**

The limited availability of clinical experiences for novice baccalaureate nursing students in their first theory clinical course is the area identified for this study. The changes occurring in our health care system are changing the clinical experiences for nursing students. Studies may support HFS as an educational method at the novice baccalaureate nursing student level along with the clinical experience.

The change in the health care delivery system has resulted in a shortened length of stay in acute care facilities for patients, a low patient census, and a limited variety of medical diagnoses for learning experiences. This change in health care delivery does not allow the novice baccalaureate nursing student sufficient time to use their nursing knowledge and performance skills related to the limited availability of patients. The low patient census decreased the number patients for students in the clinical setting that resulted in students working together in the delivery of nursing care (Fero et al., 2010).

In their first clinical course, the novice baccalaureate nursing students are learning the nursing process and developing skills to use in the development of a plan of care. Their clinical experience has provided this learning for the novice baccalaureate nursing student. The change in health care delivery has created a decrease in the number of available clinical sites leaving nursing schools to complete or share clinical sites at these acute care facilities. The Institute of Medicine (IOM) (2001, 2011) recommendations for nursing education emphasize the need to increase safety, patient care, informatics, teamwork, and quality of care in educating future nurses (Institute of Medicine, 2001,

2011; Quality and Safety Education for Nurses, 2014). The IOM recommendations along with the decrease in clinical sites and the low patient census have caused nursing schools to develop alternative learning methods.

Nursing education programs need to meet the increasingly complex care management necessary for today's nurses functioning in the health-care environment (Lasater, 2007). Nursing schools are beginning to make investments in alternative learning methods such as HFS. This investment in technology by nursing programs can be an alternative learning method for providing enhanced nursing education; provided faculty are familiar with and trained in HFS procedures (Medley & Horne, 2005). There is a lack of evidence that simulation benefits the novice baccalaureate nursing student; including the application and integration of simulation as an educational model; and inadequate direction for the use of simulation (Schiavenato, 2009).

Research shows that simulation in nursing education is gaining in reliability and validity as a method for teaching senior level nursing students the necessary experiences. Students experience hands-on performance skills, develop their critical thinking skills; increase their nursing knowledge, and develop their self-confidence in a critical care setting (Fero et al., 2010). In some states, the state licensing board for nursing education has allowed simulation experiences in place of a percentage of clinical experience (Gates et al., 2012).

### **Significance of the Problem**

The introduction of HFS as a nursing education method for upper-level nursing students is becoming a solution for the lack of clinical experiences. A systematic review of

simulation studies shows improvement in knowledge, performance skills, critical thinking skills, and self-confidence. These studies support HFS as a method of teaching and learning for upper-level nursing students (Cant & Cooper, 2010; Lewis & Ciak, 2011). Lasater (2007) indicated that HFS is a means to advance clinical judgment skills for baccalaureate nursing students. Her findings have indicated that more research with a broad, culturally-diverse population of nursing students must be conducted to link performance in simulation experience, clinical judgment, and clinical experience (Lasater, 2007). Lasater's (2007) study added to other studies examining the use of simulation experiences as an effective education method that affects the knowledge, critical thinking skills, performance skills, and self-confidence of novice baccalaureate nursing students.

Studies involving novice baccalaureate nursing students in their first *theory* clinical course using the variables of nursing knowledge, performance skills, critical thinking skills, and self-confidence is limited (Fero et al., 2010; Gates et al., 2012; Waxman, 2010). Nursing instructors should use simulation experiences as an education method in the first clinical course level as well as the advanced nursing classes (Miller, 2010; Smith and Roehrs, 2009). High-fidelity simulation use will occur as evidence-based practices in simulation are developed and implemented including best practices assimilated into the scenarios and training of faculty in use and benefits of simulation. Researchers are focusing on simulation research that will provide benefits for nurse educators and nursing students (Sanford, 2010). This study adds to the knowledge of the benefits of the use of evidence-based HFS scenarios with novice baccalaureate nursing students in their first theory clinical course. The study incorporates the recommendations

of the IOM for nursing education to increase safety, patient care, informatics, teamwork, and quality of care in the education of future nurses (IOM, 2001).

### **Purpose Statement**

The purpose of this study was to examine the relationship that existed between the use of evidence-based HFS and the novice baccalaureate nursing students development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. This study investigated the influence of the independent variable HFS on the nursing knowledge, performance skills, critical thinking skills, and self-confidence to investigate whether a relationship existed that influenced the novice nursing students.

### **Research Question**

The problem statement leads to the development of the following question. Does the use of evidence-based high-fidelity simulation provide novice baccalaureate nursing students the experience to develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and develop the self-confidence to provide safe patient care?

### **Hypotheses**

The hypotheses developed from the research question include:

$H_o$  1 The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the nursing knowledge development of baccalaureate nursing students.

$H_a$  1 The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in nursing knowledge development of baccalaureate nursing students.



*H<sub>o</sub> 2* The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the improvement in performance skills of baccalaureate nursing students.

*H<sub>a</sub> 2* The use of an evidence-based high-fidelity simulation scenario is related to a significant improvement in the performance skills of baccalaureate nursing students.

*H<sub>o</sub> 3* The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the development of the critical thinking skills of baccalaureate nursing students.

*H<sub>a</sub> 3* The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in the development of the critical thinking skills of baccalaureate nursing students

*H<sub>o</sub> 4* The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the development of self-confidence in baccalaureate nursing students.

*H<sub>a</sub> 4* The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in the development of self-confidence in baccalaureate nursing students.

### **Theoretical Framework**

Benner's nursing theory From Novice to Expert (1984) is a framework for developing clinical expertise. Her framework based on the Dreyfus Model of Skill Acquisition and explains the manner in which learning occurs in nursing and its relevance for clinical teaching in nursing. Benner identifies five themes to clarify the stages of development; novice, advanced beginner, competent, proficient, and expert.

The first theme (novice) describes students with no experience. They are learning general concepts to help perform tasks; their performance is limited by rules and is not flexible. In other words, they are instructed on procedures and follow the instruction. The novice has no life experience in the application of nursing theory or performance skills. Performance skills do not rely on theoretical knowledge alone but on the application of the nursing knowledge in practice for the understanding of theory and performance skills (Benner, 1984).

Nurse educators are applying practice to the understanding of theory with performance skills, and Benner's novice level relates to beginning nursing students. The novice student focuses on the objective, measurable attributes in a situation, explained without previous experience, is directed by theories from classroom education, and limited to individual focus on signs and symptoms. Benner defines experience as actively refining predetermined concepts and expectations. Theoretical nursing knowledge occurs after clinical experience results in understanding (Benner, 1984; Waldner & Olson, 2007).

The second theme (Advanced Beginner) students exhibit a grasp of a clinical situation and rely on their ability to determine relevant from irrelevant information or perceptual awareness. The third theme (Competent) students relate to the understanding of the way their nursing actions impact the patients' long-term outcomes (O'Connor, 2006). Benner's first theme novice defines the sample of this study involving simulation use in the education of novice student nurses.

Benner's concepts of the novice to expert theory can be applied at different levels of nursing students as they gain in nursing knowledge. Benner's theory provides a framework for the development of learned nursing knowledge, clinical judgment, self-

confidence, skills performance, and satisfaction (Harris, Eccles, Ward, & Whyte, 2012). Practice gives nursing students experiences to apply, adapt, and link theoretical knowledge and practical knowledge in the process of developing skills. This experience improves learning once nursing students theoretical knowledge challenged by clinical evidence, supports their theoretical understanding.

The first three levels of Benner's (1984) theory referred to as skill achievement levels focusing on assessment skills. As the student moves from assessing one area of a situation to assessing several areas, and makes decisions based on findings, they move from novice to advanced beginner to a competent level. The student improves performance skills with repetition, and clinical judgment is developed. Benner's (1984) theory combined with Kolb's (1984) experiential learning theory relates the concepts of experience with theoretical knowledge for simulation use in nursing education (Waldner & Olson, 2007).

Kolb (1984) developed his learning style model in early 1970 (see Appendix A). He thought that knowledge developed through a transformational process was continuously evolving. The learner approaches a subject with defined ideas accumulated from past experiences, heredity, and the present environment. The combination of these factors influences the individual's learning styles. Kolb (1984) described his experiential learning as a four-stage cycle incorporating the four learning modes of concrete experience or accommodating; reflective observation or diverging; abstract conceptualization or converging; and active experimentation or assimilating. For novice nursing students, the learning begins with a concrete experience or accommodating, then reflection of observations or diverging, to developing an abstract concept of the

experience or converging, and finally active experimentation or assimilating through clinical experience or simulation experience (Kolb, 1984; Smith, 2001; Waldner & Olson, 2007).

Kolb (1984) defined the process of learning as beginning once the learner has experiences that result in learning. The reflection on the experience gives it meaning; this meaning develops into a concept that merges into the existing cognitive frameworks. The framework becomes allied in new situations or experiences that result in the formation of new concepts and frameworks. Students' knowledge comes from and through experience; from the experience of doing and through the experience of reflection. Kolb's learning theory applies to student nurses by their reflection on clinical or simulation experiences, and the conceptualization of the experiences applied to new experiences (Waldner & Olson, 2007). Student debriefing with discussions adds to the students' learning. Debriefing causes students to reflect and critically think, and faculty can share relevant experiences with students. Knowledge assimilation occurs at this time (Garrett, MacPhee, & Jackson, 2010). Kolb's learning theory has been used as a guide for simulation-based education as experiential learning is a method to acquire knowledge that includes the needs of all learners (Poore, Cullen, & Schaar, 2014).

Using Benner's (1984) theory as a theoretical framework for examining the use of HFS with novice nursing students will define situations that should, or could be taught using simulation. Benner's Novice to Expert theory and Kolb's Experiential Learning Theory are being used by nurse researchers as a framework for conducting studies including HFS for nursing education. Larew, Lessans, Spunt, Foster, and Covington (2006), along with Bambini, Washburn, and Perkins (2009) and Harris et al. (2012) used

Benner's concepts and Kolb's learning theories in their research to define the performance characteristics of nursing students with differing levels of clinical skills. Simulation provides experiential learning that focuses on patient monitoring functions, clinical skills, management skills, self-efficacy, self-confidence, and communication. Simulation allows for the repetition of clinical and management skills that will enhance nursing students' knowledge (Larew et al., 2006). A framework based on Benner's theory and Kolb's theory will add to an understanding of nursing students' performance, the reason, and the way simulation will enhance their learning.

Kolb stated that learning involves four styles: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb thought that students use all four styles alone or in combination during the learning process (Billings & Halstead, 2012). The researcher used Kolb Model of Experiential Learning as the framework for the design of the simulation scenario this study.

### **Definitions of Terms**

*A baccalaureate nursing student* is an individual enrolled in a four-year Bachelor of Science nursing program at a university (Wilkinson & Treas, 2011). The program provides an education in both the arts and science, lasts at least eight semesters, and prepares the nurse to provide direct care in acute settings or in the community, use research, and become lifelong learners (Wilkinson & Treas).

*Nursing knowledge* incorporates theoretical knowledge, practical knowledge, and ethical knowledge (Wilkinson & Treas, 2011). Theoretical knowledge is information, facts, principles, evidence-based nursing theories, and other related theories. Practical knowledge is combining the decision process and nursing process, nursing procedures,

and nursing experience. Ethical knowledge is knowledge of obligation, right and wrong, moral principles, and the process for making moral decisions (Wilkinson & Treas). A pretest-posttest was given to evaluate the students' nursing knowledge by using multiple choice questions to determine their understanding of theoretical knowledge, practical knowledge application, ethical application knowledge, and critical thinking. The pretest-posttest was developed from the instructors test bank for their textbook *Fundamentals of Nursing* (Wilkinson & Treas).

*Self-confidence* is the students' personal attitudes toward their learning and ability to perform the skills necessary for safe patient care (Todd, Manz, Hawkins, Parsons, & Hercinger, 2008). The Simulation Design Scale (SDS) (see Appendix B) evaluated the students' response to the simulation as an educational method to develop self-confidence in care delivery through instructor feedback and problem solving. The Student Satisfaction and Self-confidence in Learning (SSSCL) (see Appendix C) a five-point Likert scale was used to evaluate student satisfaction with learning, self-confidence in learning, and self-confidence in developing the skills for clinical experiences. Positive feedback from instructors promoted student self-confidence (Todd et al., 2008).

*Critical thinking* was defined by Paul (1990) as the process of thinking while thinking to make the subject clear, accurate, or defensible (Wilkinson and Treas, 2011). Critical thinking is a combination of reasoning, using alternatives, reflections, and seeking truth in decision making. Critical thinking skills are the cognitive processes used in problem-solving and making decisions. Skills include gathering information, identifying the problems, thinking of actions, evaluating, listening, organizing, making inferences,

visualizing, and exploring (Wilkinson and Treas). Critical thinking skills are necessary to provide care by applying knowledge to clinical care interventions appropriate to the situation. High-fidelity simulation allows nursing students to become aware of the importance of identifying data that relate to prioritizing care delivery, by applying learning critical thinking skills are developed (Stroup, 2014). Jeffries (2005) developed student evaluation instruments for the National League for Nursing (NLN). Students use these tools to evaluate their simulation experiences related to critical thinking skills, performance skills, and self-confidence to deliver safe patient care. The SDS is a 20-item, five-point Likert scale developed to measure the simulation objective outcomes and the importance of problem-solving with feedback to their critical thinking. The Educational Practices Questions (see Appendix D) is a 16-item, five-point Likert scale developed to measure active learning, collaboration, diverse ways of learning, and high expectations (Jeffries, 2005).

*Performance skills or nursing skills* are part of the four nursing concepts of thinking, doing, caring, and patient situation (Wilkinson and Treas, 2011). Doing includes the practical knowledge of the manner in which skills, procedures, and the process of delivering nursing care to patients is being performed (Wilkinson and Treas). The instructors' evaluation tool, the Creighton Simulation Evaluation Instrument (C-CEI) (see Appendix E), was used to evaluate the student performance in the areas of assessment, communication, critical thinking, and technical skills.

*Evidence-based high-fidelity simulations* scenarios are created to duplicate real life experiences in a safe environment that promotes student learning (International Nursing Association for Clinical Simulation and Learning (INACSL, 2013). Guidelines for

Evidence-Based Simulation (EBS) include: (a) the development of clear learning objectives, (b) the level of fidelity identified, (c) appropriate knowledge level for problem-solving, (d) student support cues or prompts provided as needed, and (e) allowing adequate debriefing time for learning to occur (INACSL, 2013).

*Outcomes* should include learning knowledge, skill performance, learner satisfaction, critical thinking, and self-confidence (INACSL, 2013). The simulation should address educational practices including active learning, collaboration, feedback, high expectations, diverse learning, student/faculty interaction, and time on task. Evidence-Based Simulation follows the nursing education simulation framework developed by Jeffries (2007) for the NLN (Waxman, 2010, INACSL, 2013). In this study, the two simulation scenarios follow the guidelines and outcomes. They included *the Basic Assessment of the Hip Replacement* and *Abnormal Variations of Heart Rate in 87-Year-Old* (Program for Nursing Curriculum Integration (PNCI, 2012).

### **Scope of the Study**

Research shows that the use of high-fidelity simulation in nursing education is gaining in reliability and validity as a teaching model to provide nursing students with the experiences needed for skills development (Fero et al., 2010). Davis and Kimble's (2010) study included novice baccalaureate nursing students in their first clinical course who are learning the nursing process and developing the needed skills to use the nursing process in developing a plan of care. The pretest-posttest evaluated the students' nursing knowledge. The NLN student survey instruments include the SDS, the SSSCL, and the EPQ, evaluated the simulation experience from the students' point of view (Davis and Kimble, 2011; Jeffries, 2005). The C-CEI measurement tool evaluated the nursing students' ability



to meet the minimum outcomes of performance in the simulation by the instructor (Todd et al., 2008). This study was a quasi-experimental quantitative, simple, interrupted time-series design using a convenience sample of novice baccalaureate nursing students in their first nursing clinical course, to answer the research question.

### **Assumptions**

In this study, several assumptions were made. The first assumption was that students enrolled in the course would participate in the research study. The second assumption was that students would work independently in completing the Likert scale questionnaires following the debriefing. The third assumption was that students would answer the pretest- posttest questions to the best of their ability. The fourth assumption was that all the participants in the study are equal in nursing knowledge, critical thinking, performance skills, and self-confidence. The fifth assumption was that the faculty facilitating the simulation would follow the script to provide equivalent simulation experiences for the students.

### **Limitations**

Limitations of this study included the enrollment limit to the nursing program of 40 novice baccalaureate nursing students in their first theory and clinical course. The assignment to clinical groups was performed by the registrar upon student registration for the course. The student population size and convenience sample size limit the generalization of the findings in this study. The demographic data could interest another similar school of nursing programs with similar student populations for replication of this study.

## **Delimitations**

The study sample included baccalaureate nursing students in the first clinical course. The criteria for admission to the first clinical course included the completion of required courses for language, writing, and science, and a GPA of 2.5. The time frame of this study was one semester, starting in January 2015 and ending in May 2015. The location of the study was the classroom and simulation lab in the school of nursing. The students were given an introduction letter to the study along with an informed consent to sign that outlined the procedures for the study. The pretest-posttest measurements would provide the data to assess their nursing knowledge, critical thinking, and assessment knowledge. The NLN student evaluation tools would provide the data to assess the variables of performance skills, critical thinking skills, and self-confidence to provide care from the students' perspective. The instructors' evaluation tool, the C-CEI, a quantitative evaluation tool was used for the evaluation of the students in the area of assessment, communication, critical thinking, and technical skills (Todd et al., 2008). The course instructors for theory and lab/clinical were the administrators for the pretest, simulation scenarios, the NLN evaluation tools, the C-CEI evaluation, and the posttest. The first simulation conducted in week four before the first clinical experience used the evaluation tools; the second simulation conducted at nine weeks into the course and used the same evaluation tools for comparison.

## **Summary**

High-fidelity simulation (HFS) use in nursing education is growing as the health care delivery system changes the manner in which people receive health care. These changes have affected the availability of experiences for novice baccalaureate nursing

students in their first clinical course. This study added to the existing knowledge of the use of evidence-based HFS scenarios with novice baccalaureate nursing students in their first clinical course. High-fidelity simulation is an educational method that may provide a variety of medical diagnoses and experiences for novice baccalaureate nursing students. Simulation may develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and gain self-confidence in providing safe patient care.

In Chapter 2 the literature review presents the significant contribution of HFS studies as an education method for nursing students. The findings address the effects of simulation experiences on the development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence to deliver safe patient care. The gap in existing research showed that studies need to include novice baccalaureate nursing students as well as upper-level nursing students.

## Chapter 2

### Literature Review

Chapter 2 contains a review of the benefits of high-fidelity simulation (HFS) for baccalaureate nursing students in the development of their nursing knowledge, improvement of their performance skills, development of their critical thinking skills, and their ability to be confident in providing safe patient care. Simulation use began in 1874, with research in HFS beginning in 2001. The research on the influence of simulation as an educational method for novice nursing students using the dependent variables of nursing knowledge, performance skills, critical thinking skills, and self-confidence in providing safe patient care has been minimal. Simulation as an educational method for learning with nursing students in advanced nursing courses is accepted, but the use of simulation as an educational method for learning with novice baccalaureate nursing students requires additional evidence. The purpose of this study was to examine the relationship that existed between the use of evidence-based HFS and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence.

#### **Documentation**

A literature search was conducted using the keywords; high-fidelity simulation, nursing education, experiential learning theory, Kolb's Experiential Learning Theory, Benner's Novice to Expert theory, nursing knowledge, clinical thinking skills, self-confidence, and performance skills. The results were from multiple data sources including ProQuest, ProQuest Nursing and Allied Health Source, EBSCOhost, CINAHL, MEDLINE, Sage Journals, and ProQuest Dissertations. The results included research

findings, literature reviews, editorial articles, informational articles, and published dissertations. Inclusion criteria for the review of research articles included quantitative and qualitative research articles with student learning variables including nursing knowledge, critical thinking skills, performance skills, and self-confidence. Identified were a total of 83 relevant articles, and the review of the literature included approximately 50 articles. Exclusion criteria for these articles included qualitative studies using focus groups and interviews with senior nursing students in critical care simulations.

### **History of Simulation**

The early education of nursing students focused on the cognitive, psychomotor, and affective domains. The education in the classroom with lectures, in the laboratory with skills training, and in the health care delivery setting with clinical experiences addressed these domains. In 1874 anatomical models were jointed skeletons. The National League for Nursing (NLN) included the use of anatomical models in their national standard curriculum in 1919. Task trainers have been used to teach skills for at least a century. In 1910, Mrs. Chase was introduced as a procedure mannequin. Role playing was included to supplement theoretical learning, and games were incorporated to develop the students' decision-making skills; games had advantages and disadvantages in nursing education.

Computer-assisted instruction (CAI) became available in 1980. The American Nurses Association, in 1986, noted that student learning with CAI was more efficient than classroom learning. Low-fidelity to high-fidelity mannequins have been incorporated into nursing education to teach critical care, cardiac care, and labor and delivery skills, critical thinking, and clinical judgments (Nehring & Lashley, 2009). Simulations using static mannequins, task trainers, case studies, and role-playing historically are being used in

nursing education. These educational activities do not benefit students learning related to the objectives for the activity. Static mannequin simulation does not display a realistic environment for skills practice or performance and interaction with patients during skills practice (Smith & Roehrs, 2009).

Anatomical models, CAI, low and high-fidelity mannequins are used today in nursing education. These methods may not help novice nursing students develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and provide self-confidence in delivering safe patient care with the limited acute care experiences. High-Fidelity Simulation (HFS) provides a realistic environment for novice nursing students to develop nursing knowledge, improve skills, develop critical thinking skills, and gives them the needed self-confidence to provide safe patient care (Davis et al., 2014; Gates et al., 2012; Kaas, 2012; Medley & Horne, 2005).

### **Simulation in Nursing Education**

High-Fidelity Simulation (HFS) is an educational method being used to evaluate nursing students' critical thinking skills, clinical judgment, self-confidence, skills performance, and satisfaction. Lasater, (2007) found that simulation experiences allowed junior level nursing students to integrate theory, laboratory skills, and clinical practice in a safe and challenging situation. His study also proposed that simulation experiences can support and affect the development of nursing students as an adjunct to their clinical experiences (Lasater, 2007).

Evidence-based HFS is being used in nursing education (Garrett, MacPhee, & Jackson, 2010). Aebersold (2011) indicated that evidence-based learning needs to be in the development of evidence-based HFS. Informational articles have indicated that

simulation experiences are needed to provide nursing students with the experiences not available in the acute care setting. High-fidelity simulation also supports and promotes the use of evidence-based practice and evidence-based learning. High-fidelity simulation is realistic; the interactive patient scenarios educate and improve the students' performance skills, nursing knowledge, and critical thinking abilities. High-fidelity simulation scenarios need evidence-based learning objectives, the scenarios validated by other instructors, and scenarios reviewed and tested by students and backed by evidence-based literature (Waxman, 2010).

A quasi-experimental study consisting of a convenience sample of 63 nursing students enrolled in nursing care of children and maternal newborn population studied the effects of simulation on nursing students' learning over four semesters (Lewis & Ciak, 2011). The simulation scenarios addressed pediatric and obstetrical situations for the students to assess and develop interventions. The dependent variables were satisfaction, self-confidence, cognitive learning, and critical thinking. Their results were positive for satisfaction, self-confidence, and knowledge; effects on critical thinking were inconclusive (Lewis & Ciak, 2011).

An exploratory study evaluated the methods for improving simulation in the curriculum by measuring the dependent variables of knowledge, self-confidence, skill performance, and clinical judgment. The study used a pretest-posttest with NCLEX-style questions given to 84 students from two different nursing courses before the simulation and in the final examination. The pretest-posttest data were used to evaluate the simulation method of education on nursing students' cognitive knowledge in medical-surgical and critical care courses. Their results indicated a positive effect on knowledge after

simulation but not long term knowledge. The results from the study provided faculty with information on structuring simulation for students (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010).

Blum et al., (2010) conducted a study to determine whether simulation was an effective education method for nursing students in their first clinical course used self-confidence and competence as dependent variables. Their study was a quasi-experimental, experimental study using a volunteer sample of 37 students enrolled in laboratory sections for the quasi-experimental porting and 16 volunteer students in the control group. The Lasater Clinical Judgment Rubric was the measurement tool, and Tanner's Clinical Judgment Model was the theoretical framework. The results of the study did not support the use of simulation for beginning students but did provide a means to assess the students' satisfaction and self-confidence (Blum et al., 2010).

### **Nursing Knowledge**

Knowledge in nursing is related to the performance in the clinical setting. The relationship between knowledge and performance needs to be understood as it relates to the development of nursing students into professional nurses. A study by Whyte, Ward, and Eccles (2009) examined the relationship between knowledge and performance with novice student nurses and experienced nurses using simulation. The areas examined included knowledge, performance, relationship between knowledge and performance, and the relationship of educators experience and knowledge (Whyte, Ward, & Eccles, 2009). A dissertation study conducted by Bowling (2011) on the impact of HFS versus low-fidelity simulation on junior level BSN students nursing knowledge, performance skills, and self-confidence was inconclusive. A convenience sample of 73 junior pediatric



nursing students participated in an experimental design without a control group. The findings indicated that HFS did not impact the students' knowledge, performance skills, or self-confidence. Her recommendations included further research to determine the benefits that are present (Bowling, 2011).

For years, nursing educators have relied on clinical experiences for nursing students to develop nursing competencies. Nursing competencies include critical thinking and the nursing process of assessing, diagnosing, planning, implementation, and evaluation. With the change in health care delivery, it is becoming difficult to provide nursing students with the experiences necessary to develop these nursing competencies. High-fidelity simulation is a means to provide a safe, structured learning experience for students to provide care for patients with a variety of medical conditions. Simulation will increase their alertness to clinical problems, develop interventions, and promote collaboration to problem solve (Larew, Lessans, Spunt, Foster, & Covington, 2006).

High-fidelity simulation has many benefits in nursing education. The use of simulation experiences offered students a realistic substitute for clinical experience, and they were able to observe the results of their care in a safe environment. It allowed the students to follow patients from admission to discharge replication a real life nursing experience; this was not possible in clinical experiences. The use of HFS also allowed students to transfer didactical knowledge into practice knowledge immediately. This transfer of knowledge indicated that knowledge is increased with HFS (Gates et al., 2012).

### **Performance Skills**

Research supports the use of HFS for learning clinical performance skills by nursing students because it provided a learning environment that allowed students to learn

by doing. The learning by doing supported the use of the Dreyfus model or Kolb's model of experiential learning and Benner's Novice to Expert model. High-Fidelity Simulation (HFS) allowed the student to move from being an observer to a performer and allowed for interaction between the participating students to promote teamwork and collaboration (Roberts & Greene, 2011).

Areas of medical training including surgery, anesthesiology, and trauma are using HFS for skills-based practice with findings indicating that students learn performance skills faster, and performance is higher compared with those using traditional educational methods. The use of HFS as an educational method in nursing education is growing, and studies are needed to evaluate the development of nursing students clinical skills. Similar outcomes with the use of HFS and nursing students in their first clinical course were recorded (Garrett, MacPhee, & Jackson, 2010).

A *boot camp* experience for medical students was designed using simulation to examine their clinical skills (Wayne et al., 2014). These skills included physical examination techniques, paracentesis and lumbar puncture, recognition and management of patients with life-threatening conditions, and communication with patients and families. This simulation *boot camp* for medical students ensured that the medical students were competent to begin their postgraduate course (Wayne et al., 2014).

Jeffries (2005) defined skills performance as the technical and non-technical skills necessary for competent performance in the clinical experience. These skills are essential for the development of clinical nursing competency by novice baccalaureate nursing students. Nasogastric tube insertion and indwelling urinary catheter insertion are two examples of skills that simulation provides students with a positive attitude and skill

achievement. Other advanced level clinical skills become enhanced with simulation experiences; students' self-confidence and self-efficacy in their skill performance improved with HFS (O'Donnell, Decker, Howard, Levett-Jones, & Miller, 2014).

Pre-hospital skill checks are used to document that a skill is performed correctly once; this does not indicate that students are competent and confident to perform this skill in a clinical setting. Nursing students need to reflect on their clinical experience and determine where improvement in skill performance is necessary. Simulation offers nursing students the opportunity to practice and improve their performance skills in a safe, controlled environment without fear of negative criticism. The clinical educator role is to recognize performance skills that need improvement and develop simulation time in which the nursing student can practice (Clapper & Kardong-Edgren, 2012).

The technological advancements in simulation are changing the model for nursing education. Today's nursing student is expected to function at a higher level in the workplace after graduation. Performance skills development for novice baccalaureate nursing students in their first theory and clinical course is important. Hands-on learning in a safe environment is being provided with HFS. Research studies in psychomotor skills preparation showed an increase in novice baccalaureate nursing student skill performance after participation in HFS scenarios (Stroup, 2014).

### **Self-confidence**

In a pilot study with a convenience sample of 30 senior nursing students from an undergraduate nursing program, Garrett et al. (2010) found that students thought their self-confidence increased with practice, including observation of changes that resulted from their interventions. The HFS scenarios encouraged students to think about underlying

concepts and principles in their clinical situations. The safe environment and repeated practice had improved clinical performance skills (Garrett et al., 2010).

A school of nursing in Northern Ireland developed an HFS scenario that developed self-confidence and proficiency in delivering patient care. The aim of the HFS included creating opportunities to develop self-confidence and proficiency by becoming the nurse, and to integrate theory into practice in a structured environment. The learning outcome of this HFS included performance of a patient assessment, implementing the appropriate nursing interventions, working as a team member, communicating effectively, displaying knowledge of others roles, and reflecting on all the outcomes of the scenario. The results indicated that simulation experiences increased organizational skills from 13.3% to 85.6%, increased clinical performance skills from 2.2% to 96.7%, increased diagnostic skills from 1.1% to 96.7%, increased self-confidence from 13.3% to 81.1%, and was a learning experience from 0% to 98.9%. Simulation created an environment that was realistic, and the experience was beneficial to students (Traynor, Gallagher, Martin, & Smyth, 2013).

Smith (2009) conducted a descriptive correlational study on the effect of simulation experiences on nursing student satisfaction and self-confidence. The study used a convenience sample of 68 junior nursing students in a medical/surgical nursing course. The National League for Nursing (NLN) instruments, the Simulation Design Scale (SDS) and the Student Satisfaction and Self-Confidence in Learning Scale (SSSCL) five-point Likert scale were used. The results indicated student satisfaction and a positive effect on self-confidence for providing care to patients; this satisfaction and self-confidence did not correlate with previous simulation experiences. They determined that HFS was a satisfying learning experience and increased student self-confidence (Smith, 2009).

Literature supports the use of simulation in the development of the nursing students' self-confidence. Self-confidence is a complex term that includes many aspects; it can impact the nursing students' ability to perform in the clinical setting, perform in stressful situations, and in the performance of psychomotor skills. Measurement instruments that evaluate self-confidence as an outcome of simulation include pretests/posttests and five-point Likert-type scales. Research findings showed a statistically significant difference between combining simulations with lecture versus lecture only. The studies' limitations and gaps indicate that there was a need for future research to validate the effects of simulation on self-confidence (O'Donnell et al., 2014).

### **Critical Thinking Skills**

Watson and Glaser (1980) defined critical thinking as a person's ability to see the problem, collect evidence of support, and use attitudes and knowledge to decide on an intervention. Critical thinking skills developed through HFS showed a statistically significant relationship over critical thinking skills developed through clinical experience. A study by Fero et al., (2010) used the California Critical Thinking Disposition Inventory and the California Critical Thinking Skills Test to support the findings of a significant relationship between simulation experiences and critical thinking. The study was a quasi-experimental cross-over design using a convenience sample of 36 students from diploma, associate, and baccalaureate programs. Recommendations include additional research to determine the way critical thinking skills develop with HFS compared with clinical experience critical thinking skills (Fero et al., 2010).

High-fidelity simulation (HFS) provides a method for developing critical thinking. It is being used in other medical areas to simulate medical situations for the development

of skills, priority setting, organization, leadership, and delegation. High-fidelity simulation (HFS) is being used for graduate nursing practice education and has the potential to enhance undergraduate nursing education (Medley & Horne, 2005).

High-fidelity simulation (HFS) is being used as an educational method to evaluate nursing students' knowledge, skills performance, critical thinking skills, student satisfaction, and student self-confidence. The various learning styles of students need to influence the design of HFS scenarios used as an educational model. These include visual learners, aural learners, read/write learners, and kinesthetic learners (Roberts & Greene, 2011).

Waldner and Olson (2007) suggested that Benner's (1984) theory in combination with Kolb's (1984) experiential learning theory is a framework that nurse educators can use to design simulation experiences for nursing students (Waldner & Olson, 2007). Using this framework to design HFS for students will allow the students to improve their performance by trial and error and repetition. This framework allowed for the integration of theory with practice and increased their nursing knowledge of patient care delivery (Berragan, 2011).

## **Theoretical Framework**

### **Benner's Novice to Expert Theory**

Benner's nursing theory From Novice to Expert is a framework for developing clinical expertise. This framework supports the way learning occurs in nursing and is relevant for clinical teaching in nursing (Benner, 1984). Benner's (1984) model for the development of expertise in nursing practice benefits the practicing nurses, influences staff development programs, promotes stable staffing, and allows for clinical

specialization in nursing education. At the beginning level of achievement, the model is a context for the skills development in nursing students. Benner based her model on the concept that theoretical knowledge updates practice; HFS that has experience-based skills incorporated was faster and safer as a sound educational method (Waldner & Olson, 2007).

Benner's five themes clarify the stages of development; novice, advanced beginner, competent, proficient, and expert. The first theme (novice) is a beginner with no experience. Benner defined experience as actively refining concepts and expectations. Novice baccalaureate nursing students nursing knowledge begins after clinical experience results in understanding (Benner, 1984; Waldner & Olson, 2007). The novice baccalaureate nursing students learn clinical performance skills in a lab setting and nursing concepts in theory classes. Simulation allows novice baccalaureate nursing students to apply newly learned theory and performance skills in a controlled safe setting (Bambini, Washburn, & Perkins, 2009). The advanced beginner students have an understanding of the clinical situation and are dependent on their ability to determine relevant from irrelevant and their perceptual awareness (O'Connor, 2006). Larew et al. (2006) applied Benner's theories to the performance characteristics and learning needs of nursing students along with their level of competencies into their simulation scenarios. These scenarios allowed the students to develop perceptual awareness, patient management, communication skills, and collaboration skills (Larew et al.). The combination of Benner's nursing theory and Kolb's experiential learning theory provides a theoretical framework for examining the use of simulation with novice nursing students (Waldner & Olson, 2007).

### **Kolb's Experiential Learning Theory.**

Kolb's Model of Experiential Learning Theory (ELT) is a framework for learning that applies to learning through simulation (Smith, 2001). Kolb stated that learning involved four styles: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb indicated that students use all four styles alone or in combination during the learning process (Billings, & Halstead, 2012). Kolb indicated that experiences are concrete and that reflective observations lead to abstract thinking about concepts that result in active experimentation (Stichler, & Hamilton, 2008).

Kolb defined learning as knowledge created by the conversion of an experience; the combination of understanding, and the changing of the experience (Kolb, 1984). Nursing students need to experience all phases of the experiential learning cycle to experience ideal learning. This learning occurs during the simulation scenario and with the debriefing session. Kolb's ELT is a method of delivering individualized nursing education to each student outside of the silo method (Poore, Cullen, & Schaar, 2014).

Kolb (1984) defined the process of learning as beginning after the learner has experiences that result in learning. The reflection on the experience gives it meaning; this meaning develops into a concept merged with existing cognitive frameworks. The framework applied in new situations or experiences results in the formation of new concepts and frameworks. The learner learns by and from experiences: the doing and the reflection on the actions during the experience produces learning (Waldner & Olson, 2007).



Nurse researchers are using Benner's Novice to Expert theory and Kolb's Experiential Learning Theory as a framework for conducting studies with the use of HFS in nursing education. Larew, Lessans, Spunt, Foster, and Covington (2006), along with Bambini, Washburn, and Perkins (2009) used Benner's concepts and Kolb's learning theories in their research to define the performance characteristics of nursing students with differing levels of clinical skills. Simulations provide experiential learning that focus on patient monitoring functions, clinical skills, management skills, self-efficacy, self-confidence, and communication. Simulations allow for the repetition of clinical and management skills that enhanced nursing students knowledge (Larew et al., 2006).

### **Experiential Learning in Simulation**

Beischel (2011) used a mixed methods study to examine the learning variables of lifestyle characteristics, auditory-verbal learning, and hands-on learning effects on anxiety and cognitive learning in simulation experiences with 130 nursing students in their first clinical course. Research indicated that lifestyle characteristics and auditory-verbal learning influence anxiety and auditory-verbal learning and hands-on learning influenced cognitive learning (Beischel, 2011). Bremner, Aduddell, Bennett, and VanGeest (2006) researched four areas in simulation including usefulness, realism, self-confidence/comfort, and limitations in teaching and learning in novice nursing students. Their study was a quantitative and qualitative design with a sample of 56 novice baccalaureate nursing students performing a patient assessment. The results from their study contributed to the development of best practices in HFS. Their recommendations included further studies to determine the value and input of the use of simulation as an educational method and student success (Bremner et al.; Aduddell, Bennett, & VanGeest, 2006).

In a qualitative study, Cordeau (2010) studied the teaching/learning strategies from the perspective of 19 novice baccalaureate nursing student. Five clusters identified by the students include perceived anxiety, seeking and imagining, performing, critiquing the performance, and preparing for nursing practice. The recommendation from this qualitative study was to consider the novice students perceived anxiety while designing HFS scenarios (Cordeau, 2010).

Simulation outcomes in nursing education indicate that simulation experiences produced an experiential learning environment for nursing students. From 2001 to the present, the amount of research information on simulation in nursing education has been growing. The findings indicated that simulation contributes to a learning environment that increases knowledge, skills, safety, and self-confidence in nursing students (Norman, 2012; Poore, Cullen, & Schaar, 2014).

## **Method**

Simulation research incorporates qualitative, quantitative, and mixed methods studies as methods to address the use of HFS as an educational model. Qualitative methods include an informal interview, focus groups, descriptive, phenomenological, and iterative data analysis (Richardson & Claman, 2014). The majority of research in the use of HFS as an education method has been qualitative, coming from the nursing students' perspective. Reilly and Spratt (2007) conducted a qualitative focused case study to investigate the perception of students and teachers on their experiences with HFS. The results indicated an increase in confidence for the clinical experience. Lasater (2007) conducted a qualitative focused group study of junior level baccalaureate nursing students

to examine the HFS experience in the development of their clinical judgment; the findings indicated that simulation experiences positively affect their clinical judgment.

### **Quantitative**

Quantitative methods include randomized controlled trials (RCT), quasi-experimental, and experimental using pretest-posttest, crossover, or computer-generated stratified designs. Three separate studies enlisted nursing students from pediatric and obstetric (Lewis & Ciak, 2011), medical-surgical (Gates et al., 2012), and critical care courses (Brannan, White, & Bezanson, 2008) in quantitative and quasi-experimental studies using HFS and analyzed the level of self-confidence and competence of the nursing students.

### **Significance**

Garrett et al. (2010) documented the advantages of simulation experiences including improving competencies in a safe environment. High-fidelity simulation provided real-life situations for the students to provide patient care as it stimulates critical thinking and learning teamwork. Research indicated that learning occurs through repeated practice and participating in the debriefing (Garrett et al., 2010).

Research in the use of simulation as an education method for nursing students is producing positive results in skills and student self-confidence. The positive research results provided support that simulations allow nursing students to learn the development of clinical skills in a safe, structured environment. The learning and development of skills are changing from the clinical setting to simulation. For the students, simulation allowed for experiential learning by repetition. The use of high-fidelity simulation allowed for trial

and error, failure, and the connection of theory with practice for the integration of knowledge with patient care (Berragan, 2011).

There are many benefits offered by HFS for students; these include (a) simulators are anatomically correct, (b) simulators can respond to nursing interventions, and (c) students see the results of their interventions immediately. Progressions of conditions in simulation experiences allow for response to students' actions in a short time frame providing patient outcomes, both positive and negative. Simulation scenarios can be programmed to correlate with theory topics allowing for the connection between theory and application for students (Gates et al., 2012).

### **Gap in Literature**

The use of traditional laboratory methods of return demonstrations and task trainers is effective with novice beginning nursing students; faculty now are incorporating simulation experiences in nursing education with the novice or beginning nursing students. This educational method is lacking sufficient research evidence to indicate the benefit of simulation for the novice or beginning nursing students. Additional research needs to be conducted to support these findings (Blum et al., 2010).

Simulation is an effective teaching and learning method, with an increase in knowledge, critical thinking, satisfaction, and self-confidence. There may be advantages to simulation over other methods related to the context and subject methods. The recommendations included further studies to develop educational outcomes for the students, and add to the increase of knowledge and learning (Cant & Cooper, 2010).

High-fidelity simulation as a nursing education method has become a solution to providing novice baccalaureate nursing students with needed experiences. These

experiences help to develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and provide self-confidence in delivering safe patient care. Richardson and Claman (2014) suggested further research to support the validity of HFS, the benefits of simulation in theory, and the impact on patient and student outcomes. The study was conducted to partially fill the gap in knowledge by demonstrating the influence of simulation experiences on student outcomes.

### **Summary**

Informational and research articles indicated that simulation experiences are needed to provide nursing students with the experiences unavailable in the acute care setting. Simulation has provided nursing students with the experience of situations unavailable in their clinical experience (Miller, 2010; Roberts & Greene, 2011). The literature included research supporting HFS as an educational method for novice baccalaureate nursing students in today's health care delivery system, and reports increased self-confidence with repetition (Garrett, MacPhee, & Jackson, 2010). The challenge is the introduction of HFS into the curriculum at the undergraduate level by faculty (Traynor, Gallagher, Martin, & Smyth, 2013). High-fidelity simulation scenarios represent real-life situations that support and promote the use of evidence-based practice and evidence-based learning (Waxman, 2010).

Benner's Novice to Expert theory and Kolb's Experiential Learning Theory was the theoretical framework used (Benner, 1984; Gardner, 2012). The variables of knowledge, self-confidence, clinical skill performance, and clinical judgment have been identified in quasi-experimental research articles (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010; Garrett et al., 2010; Medley and Horne, 2005). Recommendations

included in their review indicated the need for continued research to support the use of HFS as an educational method for novice baccalaureate nursing students.

Chapter 3 describes the research methods and design used in this study. The population and sample size is defined, and the collection process is presented. A description of the legal and ethical considerations for this study, the IRB process, the measurement tools with their reliability and validity, and the data analysis process.

## Chapter 3

### Method

The purpose of this study was to examine the relationship that existed between the use of evidence-based HFS and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. There are questions being asked regarding simulation use in nursing education. Beddingfield, Davis, Gilmore, and Jenkins (2011) researched the effect of HFS on learning outcomes versus the learning outcomes with clinical teaching; their findings indicated no difference between the educational models. Luctkar-Flude, Wilson-Keates, and Larocque (2011) study the use of HFS, standardized patients, and community volunteer as methods for practicing assessment skills. Their results indicated greater assessment skills improvement with the simulation experience over standardized patients, and community volunteers; but students were not satisfied with the simulation method. Dowie and Phillips (2011) compared the education methods of HFS and nursing lecturers; their findings indicated that faculty considered simulation experiences beneficial to learning when incorporated with lecturers. Fero et al. (2010) examined the relationship of HFS on critical thinking skills and performance in simulation scenarios. Their findings indicated a significant relationship between critical thinking and performance with HFS. Simulation research has focused on providing new findings with clinical outcomes and evidence-based teaching methods that benefits nursing educators and nursing students (Jeffries, 2009). The research question was: Does the use of evidence-based high-fidelity simulation provide baccalaureate nursing students the experiences to develop their nursing

knowledge, improve their performance skills, develop their critical thinking skills, and develop self-confidence to provide safe patient care?

This chapter addresses the research method and design used in this study.

Included in this chapter is the introduction letter for the study, the informed consent including the right to refuse participation, and the process of dropping out of the study after the start of the study. Explanations in detail include the population and sample size, the data collection process, and the data analysis process. Also discussed are the internal and external validity, as well as the reliability of the measurement tools used in this study.

### **Research Design**

This research was a quasi-experimental quantitative study that used a simple interrupted time-series, nonequivalent dependent variables, between group design. Baccalaureate nursing students in their first nursing clinical course were the participants in this study. The study was a within-subject design that used a pretest measurement of the sample to establish a baseline before the independent variable was introduced. Additional intermittent measurements followed including a posttest, National League of Nursing (NLN) Questionnaires, and the instructor evaluation to determine any change in the dependent variables (Marczyk, DeMatteo, & Festinger, 2005). This method was used to examine the students' nursing knowledge, performance skills, critical thinking skills, and self-confidence in delivering care before and after the simulation scenarios (Lewis & Ciak, 2011).

A quasi-experimental quantitative method using a simple interrupted time-series design identified the effect of high-fidelity simulation on novice baccalaureate nursing students' knowledge, critical thinking skills, their performance skills, and self-confidence



to delivering safe patient care. This design was selected because it allowed for control of the independent variable, high-fidelity simulation, without randomization of participants or a control group. In this study, the novice baccalaureate nursing students' attention was focused on the objective measurable characteristics, performance skills, and rules learned in theory. This simulation experience, for the novice nursing students, focused on acquiring skills specifically with their assessment skills (Waldner & Olson, 2007).

The independent variable was the evidence-based, high-fidelity simulation scenarios; the dependent variables were nursing knowledge, performance skills, critical thinking skills, and the self-confidence to provide safe patient care. This pretest-posttest study design used survey instruments developed for the NLN including the Simulation Design Scale (SDS), Student Satisfaction and Self-confidence in Learning Scale (SSSCL), and the Educational Practices Questionnaire (EPQ). The instructors' evaluation tool, The Creighton Simulation Evaluation Instrument (C-CEI), was developed for use at Creighton University by Todd et al. (2008) as a quantitative evaluation tool.

The pretest-posttest was conducted to assess the participants' nursing, critical thinking, and assessment knowledge. The pretest-posttest tool consisted of 15 multiple-choice questions covering the nursing process, critical thinking, and assessment. The three NLN survey instruments served as measurement tools from the student point of view and were used to assess the SDS, SSSCL, and the EPQ of performance skills and critical thinking skills. The C-CEI instructor evaluation tool evaluated the students in the area of assessment, communication, critical thinking, self-confidence, and technical skills. The NLN questionnaires and the C-CEI provided the data for analysis to accept or reject the hypothesis. The simulation took place during scheduled lab times. The faculty completed

the C-CEI instructor evaluations during the simulation scenarios, and students completed the NLN student evaluation tools after the debriefing.

### **Population and Sample**

The population for this study included all 40 baccalaureate nursing students enrolled in the spring 2015 introduction to nursing clinical course in the school of nursing at a private university. All 40 of the students enrolled in the introduction to nursing clinical course received information about the study. All 40 of the students signed the Informed Consent and agreed to participate in the study.

### **Sample**

This sample was made up of 40 students who were beginning their nursing education; 34 of the students were second-semester sophomore students in their first nursing theory and clinical course, with six students who were repeating their first nursing theory and clinical course related to a low theory grade. Sampling in educational and medical research use nonprobability samples; the most common types of nonprobability sampling is convenience and purposive samples. Researchers studying students widely used convenience samples and use caution in generalizing the results from a convenience sample. Purposive samples are gathered with a purpose, not randomly selected, and they may be typical or diverse (Vogt, 2007). The sample for this study was a diverse convenience sample with male and female students, three identified races, ages ranging from 18 to 30; some experienced previous nursing courses and some worked as certified nurse's aides. The results of this study may apply to similar groups of novice baccalaureate nursing students.

### **Inclusion and Exclusion Criteria**

The inclusion criteria for this study included all the students enrolled in the spring 2015 introductory nursing theory and clinical course. The nursing students were all second-semester sophomore novice baccalaureate nursing students starting their education. Excluded from this study were the baccalaureate nursing students enrolled in upper level nursing theory and clinical courses during the spring 2015 semester. These students were junior and senior nursing students.

### **Sample Size Calculation.**

In quantitative research, the sample size is usually the largest sample possible that is representative and generalizable to the population. To determine an adequate sample size for research hypotheses testing, researchers conduct a power analysis. A power analysis will estimate the odds of a Type II error and acceptances of the null hypotheses after no relationship exists or estimate the sample size requirements (Polit & Beck, 2014). This sample was a convenience sample of all the students enrolled and recruited in their first clinical nursing course. The use of a control group was eliminated to prevent the issue of unequal education for the nursing students enrolled in the first clinical nursing course. A sample size analysis was conducted using the formula  $n = (Z_{\alpha}^2 p/ME (cl))^2$ . Z value was calculated at 95% confidence level using a critical values table for  $t$  distribution for  $\alpha$  at 0.025 giving  $\infty$  at 1.96. The percentage of choice was 50% or 0.5 over the margin of error of confidence interval (CI) of  $\pm 17.3$ . Calculations were  $1.96 \times 0.5 = 5.66^2 = 32$  as the calculated sample size (<http://www.surveysystem.com/sscalc.htm>; Munro, 2005; Polit, 2010; Adamson & Prion, 2013). This study exceeded the calculated sample size of 32 with 40 participants.

## **Legal and Ethical Consideration**

Research studies using human subjects require permission from the Institutional Review Board (IRB) to ensure the protection of the participants (Polit & Beck, 2014). The University of Phoenix (UoP) IRB received the dissertation proposal with Appendices. The appendix contained copies of the Informed Consent (see Appendix F), the Permission to use NLN Questionnaires (see Appendix G), the Permission to use the C-CEI (see Appendix H), the Introduction Letter (see Appendix I), the Demographic Information form (see Appendix J), and the PRN Use Permission (see Appendix K) for approval of this research study. The private university IRB committee received the UoP IRB approval along with the dissertation proposal with all attached appendices for approval. The private university IRB approval granted permission for the researcher to conduct the study at their university and to recruit the 40 enrolled students in this study.

An established and commonly accepted educational setting was the site for this study qualifying it for exemption from IRB review. The educational setting involved normal educational practices that included research on the effectiveness of instructional techniques, curricula, and classroom or lab teaching methods. The research involved the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, and observation of skills (DHHS, 2014 Section 46.101b;<http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.html>).

The Family Educational Rights and Privacy Act (FERPA) apply to all areas of student involvement including participation in a study. The university conducts faculty FERPA education during the fall semester each year to comply with the federal

regulations. The instructor must assure that their assessment evaluations are accurate, and this information is not shared with others not connected with this study. An informed consent containing the title of the study, voluntary participation, the right to withdraw, the right to ask questions, the right to privacy of all information collected, their course grade would not be affected, and the benefits for participating in the study were presented.

### **Instrumentation**

The measurement tools included: a pretest-posttest, three NLN student evaluation tools, and the C-CEI for faculty evaluation. The pretest-posttest composed of 15 multiple choice theory questions evaluated the novice baccalaureate nursing students' enhancement of their nursing knowledge. The NLN questionnaires provided data about the students' opinions regarding the development of their critical thinking skills, the improvement of their performance skills, and the increase in their self-confidence to deliver safe patient care. The faculty C-CEI evaluated the students' performance in the areas of performance skills and critical thinking skills in delivering patient care. The researcher received permission to use the instruments developed for the NLN for use in simulation research and permission to use the C-CEI quantitative instructor evaluation tool.

The SDS questionnaire is a 20-item, five-point Likert scale. The categories of this questionnaire include objectives and information, support, problem-solving, feedback/guided reflection, and realism. The questions in the objective and information section referred to the participants understanding of the purpose and objectives of the simulation. The questions in the support section relate to the support of the teacher's assistance during the simulation. The problem-solving section questions refer to the participant's ability to explore all possibilities of the simulation. The feedback/guided

reflection section refers to the participants ability to analyze their behavior and actions. The realism section addressed the scenario resemblance to a real-life situation. The SDS provided data for students' critical thinking.

The SSSCL questionnaire was a 13-item instrument using a five-point Likert scale. It was designed to measure student satisfaction with the simulation activity using five items. Student self-confidence was measured using eight items. Included within the 13-items are statements about the students' personal attitude regarding the instructions received, their satisfaction with learning, and their self-confidence in learning. Their satisfaction with current learning included questions relating to the teaching methods used in the simulation. The questions in the self-confidence with learning referred to the participant's self-confidence levels with skills, critical thinking, and knowledge from the simulation to perform necessary tasks in a clinical setting. The SSSCL provided data for students' self-confidence.

The EPQ was a 16-item five-point Likert scale instrument. This questionnaire measured active learning, collaboration, diverse ways of learning, and high expectations. The active learning section included questions regarding the participants input before, during, and after the simulation. The collaboration section included questions related to working with peers during the simulation. The diverse ways of learning section included questions that reflected on the variety of ways in which learning occurs through simulation. The EPQ provided data for students' skills.

The C-CEI instructors' evaluation tool evaluated the students in the following areas: assessment, communication, clinical judgment, and patient safety. Assessment included the collection of subjective and objective data, follow-up assessments, and

performing assessments in a systematic manner. The communication included the effective communication with staff, the patient or family, accurate documentation of assessment data, are responses appropriately to abnormal findings, and professionalism throughout the simulation. The clinical judgment included interpretation of vital signs, labs, and subjective/objective data, formulation of appropriate outcomes, interventions, evaluations, and reflections. Patient safety included using appropriate patient identifiers, standard precautions, administering medication safely, proper use of equipment, correct procedure performance, and environmental safety. The C-CEI provided the teacher's perspective of the students' performance skills and critical thinking skills.

### **Validity and Reliability**

Validity is difficult to control in quasi-experimental design field settings; however, laboratory research based studies reduce the threat to validity. There are four areas of validity threats; external validity, construct validity, statistical conclusion validity, and internal validity (Vogt, 2007; Shelestak & Voshall, 2014). Threats to internal validity include history, selection, maturation, regression, attrition, and mortality. The use of nonequivalent dependent variables combined with a pretest-posttest, within subjects, and a simple interrupted time-series design is considered a valid means to reduce internal validity threats (Coryn & Hobson, 2011). A quasi-experimental within subject design with a simple interrupted time-series was conducted that addressed the internal validity of history, selection, maturation, regression, attrition, and mortality of the sample. The use of scripted lecture, simulation information, and instructor education in the use of the C-CEI evaluation tools reduced the threats of construct validity (Coryn & Hobson, 2011).

Validity and reliability of the evaluation tools in HFS research is essential to control for extraneous, confounding, and intervening variables. It allows for accurate and constant summative evaluation of the students' performance and the relationship of the dependent variables to the independent variables. The INACSL standard 7 included evaluation guidelines to ensure accurate and consistent decisions (Sando et al., 2013). In this study, measures were taken to reduce threats to content validity and fidelity of the HFS, and reliability of the instruments (Adamson & Prion, 2012).

Simulation design experts developed the HFS scenario used in this study; this controlled content validity, and the calculated content validity index (PNCI, 2012). A scripted scenario ensured all nursing students receive the same patient information and prompts to control the fidelity of the scenarios. The instructor discussed the objectives for the simulation experiences with the students; the objectives were posted on the course website online and related to the measurement instruments. The faculty facilitator participated in an online training session to ensure fidelity of the measurement tool. Instrument reliability was  $>.70$  for all evaluation instruments; indicating their stability, internal consistency, and equivalence (Shelestak & Voshall, 2014).

Four experienced faculty reviewers established content validity for the chosen pretest-posttest questions. The automatic test grader calculated the reliability of the pretest-posttest using KR20 statistical analysis. The reliability of the pretest was 0.72, and the reliability of the posttest was 0.87 from the KR20 statistical analysis. Ten experienced faculty in simulation and testing reviewed the NLN survey instruments for content validity. The reliability of the SDS using Cronbach's alpha was 0.92 for the presence of features. The reliability of the SSSCL using Cronbach's alpha was 0.94 for satisfaction



and 0.87 for self-confidence. The reliability of EPQ using Cronbach's alpha was 0.86 for specific practices (NLN Simulation Measurement Tools, 2007). The reliability of the SDS, SSSCL, and EPQ are all within the good to acceptable range; reliability is considered good at  $\geq 0.90$  and acceptable at  $\geq 0.80$  (Todd et al., 2008).

Seven experienced faculty involved with simulation reviewed the C-CEI measurement tools developed by Todd et al. (2008) for content validity using a four-point Likert scale. The results were positive with  $M=3.83$ ,  $SD=0.10$ . A group of 72 senior nursing students determined the inter-rater reliability of the C-CEI in a pilot test; four groups of 18 participated in three simulations scenarios. The reliability for the assessment section was 0.84, communication 0.89, critical thinking 0.88, and technical skills 0.85 (Todd et al., 2008). Adamson and Kardong-Edgren, (2012) conducted psychometric assessments of the C-CEI tool indicating the overall interrater reliability was .952 and the internal consistency using Cronbach's alpha was 0.979 (Adamson & Kardong-Edgren, 2012).

### **Data Collection**

The novice baccalaureate nursing students registered to participate in their first clinical course were verbally informed by the researcher about the research project during orientation to the nursing program the week before the start of classes. During a theory class, one week before the HFS scenario, they were provided with the informed consent form and the introduction letter. Time was allowed for an explanation of the benefits for participating in a research study and a question and answer period followed.

The 40 novice baccalaureate nursing students, assigned to lab/clinical section, were divided into smaller groups of four students each and assigned a simulation time.

Tuesday's lab/clinical section had six small groups and Thursday's lab/clinical had four small groups. Each group of four students was allowed one hour for the simulation scenario and debriefing session.

The first high-fidelity simulation scenario information, *Basic Assessment of the Hip Replacement Patient* (PNCI, 2012), was posted on the class website online at the start of week four. The nursing student used this information for their preconference assignment and to develop a care plan from the simulation scenario experience. Before the first simulation participants completed the demographic data survey, developed their identifier code for use with the pretest-posttest, the NLN questionnaires, and the faculty evaluation tool and completed the pretest. The debriefing session took place in the simulation lab classroom immediately after the simulation ended. The faculty member who had completed the required training in the use of the C-CEI tool completed the measurement tool on each student during the simulation and evaluated the nursing student on their performance skill and clinical judgment at the time of the simulation scenario. This simulation scenario took place during scheduled lab time in the simulation lab, as their lab/clinical experience for the week and the score from the C-CEI was their weekly lab grade.

The students completed the NLN questionnaires after the simulation scenario at the end of the debriefing session. The researcher and faculty member were not present while the nursing students complete these evaluation forms. A box placed in the classroom collected the questionnaires and the pretest to maintain confidentiality.

The second simulation scenario took place at mid-term or approximately at week nine, during the scheduled lab time. The second simulation scenario information,

*Abnormal variations in heart rate in an 87-year-old with Atrial Fibrillation* (PNCI®, ©2012), was posted on the class website online at the start of the week. Students used this information to develop their preconference assignment and develop a care plan from the simulation experience. The students participated in the HFS scenario in the simulation room in the School of Nursing. The same faculty member completed the C-CEI measurement tool on each student during the simulation and evaluated the nursing students on their performance skill and clinical judgment at the time of the simulation scenario. The debriefing session took place in the simulation lab classroom immediately after the simulation ended.

The students completed the posttest and the NLN questionnaires after the simulation scenario at the end of the debriefing session. The researcher and faculty member were not present while the nursing students completed these evaluation forms. A box placed in the classroom collected the questionnaires and the posttest; to maintain confidentiality. The data collection was during scheduled lab sessions and class time at the school of nursing.

### **Data Management**

The signed consents, demographic data, NLN questionnaires, and faculty evaluation tools are being kept in a locked file cabinet in the researcher's office; only the researcher has access to the data. The IBM SPSS 21 computer program was installed only on the researcher's computer, and the data saved on the institutions' secure hard drive. Only the researcher has access to these data. After three years, all research data will be deleted from the secure university storage.

The pretest-posttest data were entered into IBM SPSS 21 for analysis by the researcher after all the simulations were completed. The data from the measurement tools were entered into IBM SPSS 21 by identifier code for analysis by the researcher. The faculty member documented the correct identifier code on the C-CEI tool after entering the students' grades and the researcher then entered the data into IBM SPSS 21 for analysis after the sessions ended. The data were reviewed by the researcher before entry into IBM SPSS 21 to check for missing data.

### **Data Analysis**

The statistical analysis program used for analyzing data from this study was the IBM SPSS Statistics 21 software program. The data from the measurement tools were at the ordinal level and entered into the statistical analysis program. The demographic characteristics were entered to define the sample of the study. The analysis of the pretest-posttest results included a paired sample *t*-test for the pretest-posttest means that analyze the changes in nursing knowledge. The SDS data from categories and sub-categories were entered to analyze the students' perspective of the HFS objectives, support, problem-solving, feedback, guidance, and fidelity (critical thinking). The SSSCL data from categories and sub-categories were entered to analyze the students' perspective of satisfaction and self-confidence. The EPQ data from categories and sub-categories were entered to analyze the students' perspective of their learning, collaboration, and expectations. The C-CEI evaluated the students' skills including assessment, communication, clinical judgment, and delivery of safe care. The analysis included the mean and standard deviation with a paired samples *t*-test comparing the means. The correlation was conducted using the paired sample *t*-test. The paired sample *t*-tests

examine the relationship between the dependent variables of nursing knowledge, performance skills, critical thinking skills, and the self-confidence to provide safe patient care (Munro, 2005; Tabachnick & Fidell, 2007).

### **Summary**

Chapter 3 includes a summary of the method and procedures used in this study. The research design for this study was a quasi-experimental quantitative study using a simple interrupted time-series design. This design was selected because it allowed for control of the independent variable of HFS, without randomization of participants or a control group. The population was a convenience sample of novice baccalaureate nursing students in their first nursing theory and clinical course. This study identified the relationship of high-fidelity simulation with the novice baccalaureate nursing student's nursing knowledge, performance skills, critical thinking skills, and self-confidence to deliver safe patient care.

Included is a discussion of the IRB approval process from the University of Phoenix and the private university. Each student received the information letter and the informed consent explaining the rights for participating in the study. Data collection occurred through pretests-posttests that analyze nursing knowledge. The NLN Survey Instruments recorded the students' perspective, and the C-CEI recorded the facilitator observations of the students' performance skills, critical thinking skills, and self-confidence to deliver safe patient care. Data analysis included demographic characteristics and paired sample *t*-test for means and correlation of the relationship of the dependent variables. Chapter 4 contains the results of this study explained in detail, including tables to clarify the statistical analysis findings.

## Chapter 4

### Results

The purpose of this study was to examine the relationship that existed between the use of evidence-based HFS and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. The quasi-experimental research design was selected to examine the correlation between two groups without a control group; the use of a control group would disadvantage student learning. This study was a quasi-experimental design with a simple interrupted time-series, nonequivalent dependent variables, within-subjects group design (Marczyk, DeMatteo, & Festinger, 2005; Polit & Beck, 2014). This study incorporated a framework based on Benner's nursing theory From Novice to Expert (1984) and Kolb's experiential learning theory (1984). The HFS scenario assessments conducted at week 4 before the first clinical experience and week 9 after three clinical experiences included an assessment of a post-op right hip replacement patient and the assessment of an atrial fibrillation patient. A 15-question multiple choice pretest was completed before the first HFS scenario and after the second HFS scenario a posttest was completed. The National League of Nursing (NLN) student questionnaires were used to gather the students' perspective of the simulation experience and completed by the students after each HFS scenario session. A faculty member completed the Creighton Competency Evaluation Instrument (C-CEI) tool that evaluated the students' participation during each HFS scenario session.

#### **Demographic Data**

Forty novice nursing students in their first nursing theory and clinical course comprised the sample for this study. Demographic information included gender, race, age,

holds a degree in another field, participated in another nursing course, first nursing course, or a Certified Nursing Assistant (CNA). The frequency of the demographic information resulted in the following data. Gender demographics of the sample included females and males. Race demographics for the sample included three classifications for analysis: Hispanic, Black, and Caucasian. The age of the sample ranged from 18 years to 30 years of age grouped by age range for analysis purposes; 18-20, 21-25, and 26-30. Eight students verified that they were repeating this nursing course and 32 students confirmed this was their first nursing course. The results are shown in Table 1.

Table 1

*Demographics of Participants*

Category		Frequency <sup>a</sup>	Percent <sup>b</sup>
Gender	Female	32	80.0
	Male	8	20.0
Race	Hispanic	3	7.5
	Black	5	12.5
	Caucasian	32	80.0
Age	18-20	33	82.5
	21-25	5	12.5
	26-30	2	5.0
Another field	yes	0	0
	no	40	100.0
Repeating the nursing course	no	32	80.0
	yes	8	20.0
First nursing course	no	8	20.0
	yes	32	80.0
CNA	No	28	70.0
	yes	12	30.0

*Note.* <sup>a</sup>Frequency number of sample in each category; <sup>b</sup> Percent of sample in each category

## **Data Collection and Management**

The novice baccalaureate nursing students were informed of the research project by the researcher during orientation to the nursing program. Students received the introduction letter with the informed consent during theory class during week three. A question and answer time followed. Included in the question and answer session were the benefits for student participation, the process to withdraw from the study, and the right to refuse participation in the study.

The novice baccalaureate nursing students' lab groups for Tuesday and Thursday were divided into groups of four students and assigned a time to participate in the simulation scenario. Tuesday's lab had six groups of four students and Thursday's lab had four groups of students. The students completed the demographic data, identification code, and pretest before the first simulation; after the second simulation the student completed the posttest. Each group was allowed one hour to complete the simulation scenario and debriefing. Students completed the NLN questionnaires after the debriefing allowing the next group to start their simulation scenario. Students placed the completed NLN questionnaire tools in a collection box, and the researcher locked them in a file drawer after the simulation until data were entered into IBM SPSS 21 for analysis. The demographic data, pretest-posttests, completed questionnaires, and the faculty evaluation tools were returned to the locked file drawer for storage after entry into IBM SPSS 21.

## **Data Analysis**

Data from the NLN questionnaires Simulation Design Scale (SDS), Student Satisfaction and Self-confidence in Learning (SSSCL), and Educational Practice Questionnaire (EPQ) from both simulations were used to create scales in SPSS using the



transform function tab, compute variable, and add to create new variables. The new variables were for critical thinking skills, self-confidence, and performance skills from the first and second simulation NLN questionnaires. The variables were used in a paired sample *t*-test analysis to calculate the correlation of HFS on critical thinking skills, self-confidence, and performance skills. A paired sample *t*-test used the pretest and posttest results to calculate the correlation of HFS on nursing knowledge in the baccalaureate nursing students. The C-CEI faculty evaluation data from the first and second simulation were used to create scales in SPSS creating the variables for performance skills and critical thinking skills. The variables were used in a paired sample *t*-test analysis to calculate the correlation of HFS on the students' performance skills and critical thinking skills according to faculty perspective.

The within-subjects design groups used here are considered dependent groups and independent-group *t*-tests are not applicable. Dependent groups *t*-tests called paired sample *t*-tests or correlated *t*-tests, are used to compare means because the participants in the group are the same, with data collected at two separate times. Paired sample *t*-test does not prove the null hypothesis true, but that insufficient statistical data are present to reject the null hypothesis (Polit, 2010).

### **Validity and Reliability**

Reliability was analyzed using Cronbach's alpha that was 0.623 for the test of nursing knowledge; the reliability of the 15 NCLEX style multiple choice questions was lower than the acceptable range of 0.70 or higher. Cronbach's alpha analyzed the reliability of the NLN questionnaires. Reliability of student self-confidence of the first simulation was .88 and the second simulation was .89. Reliability of critical thinking skills

for the first simulation was .88 and the second simulation was .89. Reliability of performance skills for first the simulation was .89 and the second simulation was .88. Cronbach's alpha determined the reliability for C-CEI faculty instrument at 0.66. Reliability is considered acceptable at .70 or higher as shown in Table 2.

Table 2

*Instrument Reliability (Cronbach's Alpha)*

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Student satisfaction Sim I	279.35	1090.84	.78	.90	.88
Student satisfaction Sim II	279.50	1116.62	.73	.76	.89
Self-confidence Sim I	267.50	1016.50	.81	.78	.88
Self-confidence Sim II	266.58	1097.82	.72	.73	.89
Critical thinking Sim I	258.88	859.31	.79	.86	.88
Critical thinking Sim II	258.67	1021.55	.61	.74	.89
Skills Sim I	247.64	952.78	.62	.81	.89
Skills Sim II	249.05	865.75	.77	.83	.88
CCEI Sim I	15.02	.94	.49	.24	.66
CCEI Sim II	13.12	2.21	.49	.24	.66

*Note. Cronbach's alpha acceptable at > .70*

Spearman's rho validity of pretest-posttest significant at  $p < 0.01$  with  $p = 0.000$ . Spearman's rho is considered significant at  $p < 0.001$ . Spearman's rho determined the validity of the NLN questionnaires significant at  $p < 0.05$ ; self-confidence first and second simulation  $p = 0.00$ , critical thinking first simulation  $p = 0.001$  and second simulation  $p = 0.001$ , skills first and second simulation  $p = 0.00$ . Spearman's rho determined the validity of C-CEI significant at  $p < 0.01$  with  $p = 0.000$ . The NLN questionnaires were reliable and valid measurement instruments for satisfaction, self-confidence, critical thinking, and skills evaluation; the C-CEI tool was not a reliable measurement instrument at 0.661 but a valid measurement instrument as shown in Table 3.

Table 3

*Instrument Validity (Spearman's rho)*

Student satisfaction Sim I	Correlation Coefficient	1.00
	Sig. (2-tailed)	.00
	N	40
Student satisfaction Sim II	Correlation Coefficient	.54
	Sig. (2-tailed)	.00
	N	40
Self- confidence Sim I	Correlation Coefficient	.72
	Sig. (2-tailed)	.00
	N	40
Self- confidence Sim II	Correlation Coefficient	.53
	Sig. (2-tailed)	.00
	N	40
Critical thinking Sim I	Correlation Coefficient	.76
	Sig. (2-tailed)	.00
	N	40
Critical thinking Sim II	Correlation Coefficient	.38
	Sig. (2-tailed)	.02
	N	40
Skills Sim I	Correlation Coefficient	.88
	Sig. (2-tailed)	.00
	N	40
Skills Sim II	Correlation Coefficient	.54
	Sig. (2-tailed)	.00
	N	40
CCEI Sim I	Correlation Coefficient	.56
	Sig. (2-tailed)	.00
	N	40
CCEI Sim II	Correlation Coefficient	.56
	Sig. (2-tailed)	.00
	N	40

*Note. Spearman's rho significant at  $p < 0.01$*

**Research Question**

Does the use of evidence-based high-fidelity simulation provide novice baccalaureate nursing students the experience to develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and develop the self-confidence to provide safe patient care? The research question was answered by the hypothesis testing using a paired sample *t*-tests for correlation of the student and faculty

data. The hypothesis examined the relationship between HFS and the nursing knowledge, performance skills, critical thinking, and self-confidence of the novice baccalaureate nursing students.

### **Hypothesis One: Nursing Knowledge**

*H<sub>0</sub> 1 The use of an evidence-based high-fidelity simulation scenario has no relationship with the nursing knowledge development of baccalaureate nursing students.*

*H<sub>a</sub> 1 The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in nursing knowledge development of baccalaureate nursing students.*

### **Statistical Analysis**

Students' responses to the 15 question NCLEX style pretest-posttest provided the data related to the simulation experiences and nursing knowledge. A paired *t*-test was used to analyze the pretest-posttest data from simulation I and II; the simulation I pretest paired sample statistics results  $n = 40$ ,  $M = 67$ ,  $SD = 12.96$ ; the simulation II posttest paired sample statistics results  $n = 40$ ,  $M = 64.97$ ,  $SD = 13.07$ . The paired samples correlation between groups results  $n = 40$ ,  $r = 0.12$ ,  $p = 0.46$ . The paired samples test paired difference results  $M = 2.02$ ,  $SD = 17.27$ ,  $SEM = 2.73$ ,  $t = 0.74$ ,  $df = 39$ ,  $p = 0.46$ .

The scores' mean of 2.02 indicated a decrease between the first and second test. The students' total score for the pretest was 2680; the total score for posttest was 2599 leaving a decrease of 81 points. The results of the paired *t*-test were not significant and failed to reject the null hypothesis indicating no measurable relationship exists between the simulation experience and nursing knowledge as shown in Table 4.

Table 4

*Pretest-Posttest Nursing Knowledge*

Paired Samples Test								
Paired Differences								
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Sim I Sim II	2.02	17.27	2.73	-3.49	7.54	0.74	39	0.46

*Note. Significant at the  $P < 0.05$*

**Hypothesis Two: Performance Skills**

*H<sub>0</sub> 2 The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the improvement in performance skills of baccalaureate nursing students.*

*H<sub>a</sub> 2 The use of an evidence-based high-fidelity simulation scenario is related to a significant improvement in the performance skills of baccalaureate nursing students.*

**Statistical Analysis**

The NLN questionnaire Educational Practices Questionnaire (EPQ) provided the data related to the simulation experience and the students perspective of their skills using a 5-point Likert scale. A paired *t*-test analyzed the EPQ data from simulation I and II; the skills data from simulation I paired sample statistics results  $n = 39$ ,  $M = 53.1$ ,  $SD = 7.09$ ; the simulation II paired sample statistics results  $n = 39$ ,  $M = 51.44$ ,  $SD = 1.22$ . The paired samples correlation between groups results  $n = 40$ ,  $r = 0.39$ ,  $p = 0.02$ ; the paired samples test paired difference results  $M = 1.62$ ,  $SD = 8.17$ ,  $SEM = 1.31$ ,  $t = 1.23$ ,  $df = 39$ ,  $p = 0.23$ .

The EPQ mean between the first and second simulation was 1.61538 indicating a decrease in total scores from the first simulation. The students total scores from the first simulation was 2069, the total scores from the second simulation was 2062. The individual EPQ student ratings ranged from 20 points to 60 total points; the individual EPQ student rating for the first simulation only one students' score was 20 points or 2.6%, 5 students' score was 60 points or 12.8%. The individual EPQ student rating for the second simulation only one students' score was 22 points or 2.5%, and 10 students' scores were 60 points or 25%. The results of the paired *t*-test were not significant and failed to reject the null hypothesis indicating no measurable relationship exists between the simulation experience and student skills as shown in Table 5.

Table 5

*Student Perspective of Skills from EPQ*

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference				
				Lower	Upper			
Sim I								
Sim II	1.65	8.17	1.31	-1.03	4.26	1.23	39	0.23

*Note. Significant at the  $p < 0.05$*

The Creighton Comprehensive Evaluation Instrument (C-CEI) faculty instrument provided the data related to the simulation experience and students skills. A paired *t*-test analyzed the C-CEI skills data from simulation I and II; the faculty skills data from simulation I paired sample statistics results  $n = 40$ ,  $M = 6.43$ ,  $SD = 0.71$ ; the simulation II paired sample statistics results  $n = 40$ ,  $M = 7.28$ ,  $SD = 0.68$ . The paired samples

correlation between groups results  $n = 40$ ,  $r = 0.71$ ,  $p = 0.00$ . The paired samples test paired difference results  $M = -0.85$ .  $SEM = 0.08$ ,  $t = -10.1$ ,  $df = 39$ ,  $p = 0.00$ . In the faculty C-CEI evaluations, the means between the first and second simulation was -0.85 that indicated an increase in total scores for the second simulation. The total score from the first simulation was 257 and the second simulation was 291. The results of the paired  $t$ -test rejected the null hypothesis and accepted the alternate hypothesis. C-CEI Skills paired  $t$ -test  $p = .000$ ; the paired  $t$ -test is statistically significant at  $p = 0.05$  indicating a positive relationship between the simulation experience and student skills from the faculty perspective as shown in Table 6.

Table 6

*Faculty Perspective of Student Skills from C-CEI*

Paired Samples Test								
Paired Differences								
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Sim I								
Sim II	-0.85	0.53	008	-1.02	-.67	-10.1	39	0.00

*Note. Significant at the  $p < 0.05$*

**Hypothesis Three: Critical Thinking Skills**

*H<sub>0</sub> 3 The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the development of the critical thinking skills of baccalaureate nursing students.*

*H<sub>a</sub> 3 The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in the development of the critical thinking skills of baccalaureate nursing students*

### **Statistical Analysis**

The NLN questionnaire Simulation Design Scale (SDS) provided the data related to the simulation experience and the students' perspective of their critical thinking skills using a 5-point Likert scale. A paired *t*-test was used to analyze the critical thinking data from simulation I and II. The simulation I critical thinking paired sample statistics results  $n = 40$ ,  $M = 42.13$ ,  $SD = 7.44$ ; the simulation II critical thinking paired sample statistics results  $n = 40$ ,  $M = 42.48$ ;  $SD = 5.69$ . The paired samples correlation between group results  $n = 40$ ,  $r = 0.42$ ,  $p = 0.01$ . The paired samples test paired differences results  $M = -0.35$ ,  $SEM = 1.15$ ,  $t = -0.31$ ,  $df = 39$ ,  $p = 0.76$ .

The SDS mean between the first and second simulation was -0.35 indicating a small increase in total scores from the first simulation. Total student score from the first simulation was 1685; the total score from the second simulation was 1699. The change in individual student scores was not significant enough to reject the null hypothesis; this was related to the *ceiling effect* (Polit, 2010) in the 5-point Likert scale instrument. The results of the paired *t*-test were not significant and failed to reject the null hypothesis indication no measurable relationship exists between the simulation experience and critical thinking as shown in Table 7.



Table 7

*Student Perspective of Critical Thinking from SDS*

Paired Samples Test								
	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference				
				Lower	Upper			
Sim I								
Sim II	-.35	7.24	1.15	-2.66	1.96	-.31	39	0.76

*Note. Significant at the  $p < 0.05$*

The C-CEI faculty instrument provided the data related to the simulation experience and the students' critical thinking skills. A paired  $t$ -test analyzed the C-CEI critical thinking data from simulation I and II. The simulation I faculty critical thinking paired sample statistics results  $n = 40$ ,  $M = 3.9$ ,  $SD = 0.96$ ; the simulation II faculty critical thinking paired samples statistics results  $n = 40$ ,  $M = 4.9$ ,  $SD = 0.43$ . The paired samples correlation between groups results  $n = 40$ ,  $r = -0.16$ ,  $p = 0.31$ . The paired samples test paired differences results  $M = -0.95$ ,  $SEM = 0.18$ ,  $t = -5.42$ ,  $df = 39$ ,  $p = 0.00$ . The faculty C-CEI means between the first and the second simulation was  $-0.95$  indicating an increase in total scores from the first simulation to the second simulation. The total score from the first simulation was 156 and the total score from the second simulation was 194. The results of the paired  $t$ -test rejected the null hypothesis and accepted the alternate hypothesis. C-CEI Critical Thinking paired  $t$ -test  $p = .000$ ; the paired  $t$ -test is statistically significant at  $p = 0.05$  indicating a positive relationship between the simulation experience and critical thinking from the faculty perspective as shown in Table 8.

Table 8

*Faculty Perspective of Student Critical Thinking from C-CEI*

Paired Samples Test								
Paired Differences								
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Sim I Sim II	-0.95	1.10	0.18	-1.30	-.59	-5.42	39	0.00

*Note. Significant at the  $p < 0.05$*

**Hypothesis Four: Self-Confidence**

*H<sub>0</sub> 4 The use of an evidence-based high-fidelity simulation scenario has no significant relationship with the development of self-confidence in baccalaureate nursing students.*

*H<sub>a</sub> 4 The use of an evidence-based high-fidelity simulation scenario is related to a significant increase in the development of self-confidence in baccalaureate nursing students.*

**Statistical Analysis**

The NLN questionnaire Student Satisfaction and Self-confidence in Learning (SSSCL) provided the data related to the simulation experience and the students' perspective of their self-confidence using a 5-point Likert scale. A paired *t*-test was used to analyze the self-confidence *t*-test data from simulation I and II; the simulation I self-confidence sample statistics results  $n = 36$ ,  $M = 33.39$ ,  $SD = 4.78$ ; the simulation II self-confidence paired sample statistics results  $n = 36$ ,  $M = 34.50$ ,  $SD = 0.60$ . The paired

samples correlation between groups results  $n = 36$ ,  $r = 0.55$ ,  $p = 0.00$ . The paired samples test paired difference results  $M = 1.11$ ,  $SEM = 0.69$ ,  $t = -1.62$ ,  $df = 35$ ,  $p = 0.12$ . The results of the  $t$ -test were not significant and failed to reject the null hypothesis indicating HFS had no measurable relationship with students' self-confidence from the student perspective. The SSSCL mean between the first and second simulation was 1.11 indicating a slight increase in total scores from the first simulation. Total student score from the first simulation was 1237 with three missing scores; the total score from the second simulation was 1339 with one missing score. The increase in the scores of 102 was not significant enough to reject the null hypothesis; this was related to *ceiling effect* (Polit, 2010) in the 5-point Likert scale instrument as shown in Table 9.

Table 9

*Student Perspective of Self-confidence from SSSCL*

		Paired Samples Test						
		Paired Differences						
	Mean	Std. Deviation	Std. Error Mean	95% Self-confidence Interval of the Difference		t	df	Sig. (2-taile)
				Lower	Upper			
Sim I								
Sim II	1.11	125	0.69	2.50	284	-1.62	35	.12

*Note. Significant at the  $p < 0.05$*

## Summary

Chapter 4 reviewed the purpose of the study, the reason for the research design, and the theoretical framework. The chapter included data analysis statistical test including the validity and reliability analysis of the instruments. Included in the review are the research question and the four hypotheses developed from the research question.

The statistical results were presented after each hypothesis documenting the failure to reject the null hypothesis or accept the alternative hypothesis. The data failed to reject the null hypothesis for HFS and nursing knowledge, performance skills, critical thinking skills and self-confidence from the students' perspective. The data did support the alternative hypothesis for HFS with performance skills and critical thinking skills from the faculty perspective of students' participation.

Chapter 5 reviews the problem and the purpose of the study. A discussion of the conclusions with their implications for nursing students and nurse educators is presented. The discussion includes future research recommendations with suggestions for changes to future quasi-experimental study and the development of reliable and valid measurement instruments for nursing knowledge.

## Chapter 5

### Conclusions and Recommendations

Evidence at the novice baccalaureate nursing students' level supporting the use of High-Fidelity Simulation (HFS) as an alternative educational method for clinical experience is essential. The purpose of this study was to examine whether a relationship existed between the use of evidence-based high-fidelity simulation and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. Studies involving novice baccalaureate nursing students in their first clinical course using the dependent variables of nursing knowledge, skills, critical thinking, and self-confidence was limited (Fero et al., 2010; Gates et al., 2012; Waxman, 2010). A quasi-experimental research design with a simple interrupted time-series, nonequivalent dependent variables, within-subjects group design was chosen for the study to examine the correlation between two groups with no control group used (Marczyk, DeMatteo, & Festinger, 2005; Polit & Beck, 2014).

This chapter includes a discussion of the limitations and delimitations and a discussion of the research question outcomes based on the t-test statistical results for each of the four hypotheses from Chapter 3 and 4. The potential influence of the results for nursing education, nurse educators, and research are addressed. Included are the recommendations, conclusions, and suggestions for further research.

#### **Limitations and Delimitations**

Based on the enrollment limit for the first theory and clinical course in the nursing program, this study included only the 40 novice baccalaureate nursing students enrolled; including the repeating students. The student population size and convenience sample size

limit the generalization of the findings in this study. The demographic data could interest faculty in other nursing programs with similar student populations for replication of this study.

The study sample included only novice baccalaureate nursing students in their first theory clinical course and focused on assessments in an adult population. The criteria for admission in the first clinical course included the completion of required courses for language, writing, and science, and a GPA of 2.5. The time frame of this study was one semester, starting in January 2015 and ending in May 2015.

### **Demographic Interpretations**

Forty novice nursing students in their first clinical course comprised the sample for this study. Demographic information included gender, race, age, holds a degree in another field, participated in another nursing course, first nursing course, or is a CNA. The demographic data from this study are similar to other study demographics conducted in Arizona (Crouch, 2009) and Alabama (Kirkman, 2011). The demographic data from Crouch (2009) study were predominately female, between 18 and 23, and Caucasian, Hispanic, or Asian. The demographic data from Kirkman's (2011) study were predominately female, between 18 and 34, and Caucasian, African American, and Asian. Lasater's (2007) study demographic data were predominately female, under 24, and Caucasian, or ethnic minority. The demographic data from this study compared similarly to other studies; predominately female, between 18 and 25, and Caucasian, African American, and Hispanic.

## Research Question

The data analysis from the student perspective was inconclusive; the students noted only a small increase in their nursing knowledge, performance skills, critical thinking skills, and self-confidence. The small increase was not statistically significant; the null hypotheses were not rejected, and the alternative hypotheses were not accepted. The data analysis, from the faculty perspective, rejected the null hypotheses for performance skills and critical thinking skills indicating a statistically significant improvement.

Other dissertation studies conducted by Crouch (2009) used junior nursing students and Kirkman (2011) used first-semester nursing students with HFS and have reported similar findings. Crouch (2009) reported no statistical significance in problem solving (critical thinking), learning (performance skills), and self-confidence (Crouch, 2009). Kirkman (2011) reported a statistical significance in the transfer of knowledge and performance skills and no statistical significance in student perspective of self-confidence (Kirkman, 2011). A dissertation study conducted by Bowling, (2011) on the impact of HFS on junior students' nursing knowledge, performance skills, and self-confidence was inconclusive. Bowling's (2011) results for knowledge with a  $p = .461$  was not statistically significant; results for self-confidence was statistically significant with a  $p = .03$ ; and results for performance skills with a  $p = .104$  was not statistically significant (Bowling, 2011). The recommendations from the three dissertations indicated further research to determine the presence of these benefits (Bowling, 2011; Crouch, 2009; Kirkman, 2011). The three studies indicated a small increase in knowledge and performance skills, but not sufficient to reject the null hypotheses; only one study for self-confidence did reject the

null hypothesis. The three studies used a control group and conducted a simulation experience three times; this study did not use a control group and conducted a simulation experience two times.

### **Hypothesis One: Nursing Knowledge**

The failure to reject the null hypothesis along with the low Cronbach's alpha = .461 indicated the questions used in the pretest-posttest were too broad and did not adequately assess nursing knowledge in relationship to the simulation scenarios. The questions in the pretest-posttest focused on knowledge from theory readings and not the simulation scenario. Other studies that evaluated knowledge increases were self-reported from the students' perspective not from testing (Gates et al., 2012). Gates et al. (2012) study observed the effects of HFS on second semester medical-surgical students' knowledge by using content specific questions and used an experimental study with a control group that did not participate in the simulation. The results indicated an increase of 8% higher tests scores with participation in simulation (Gates et al.). This study used novice baccalaureate nursing students to investigate the effect of HFS on their knowledge of the nursing process, not on the content of the simulation scenario. The change in knowledge from the pretest to the posttest was minimal and focused on the students' cognitive level of theory. While the samples for the study groups were different, the findings of this study refuted the findings of Gates et al. (Gates et al., 2012).

### **Hypothesis Two: Performance Skills**

The changes in individual student scores from the EPQ were not significant enough to reject the null hypothesis; related to the *ceiling effect* of the instrument. The *ceiling effect* is defined as the scores are all at the higher end of the rating instrument,



resulting in a small difference in upward movement (Polit, 2010). Students rated the effects of the simulation experience on their performance skills high, four out of a possible five, after the first simulation that left a small upward movement after the second simulation with the performance skills rated at five.

The faculty perspective the students' performance skills from the C-CEI during the simulations observed an increase in the students' performance skills during the second simulation. Previous studies (Guhde, 2010; Kardong-Edgren, Starkweather, & Ward, 2008; Reilly & Spratt, 2007), found that faculty observed an increase in student performance skills after participating in a simulation. The current study found that faculty observed a 1.1% increase in students' performance skills after participating in the simulation, supporting the results of other studies.

### **Hypothesis Three: Critical Thinking Skills**

The changes in individual student's scores from the SDS were not significant enough to reject the null hypothesis; related to the *ceiling effect* in the instrument. Students rated the effects of the simulation experience on their critical thinking skills high, four out of a possible five, after the first simulation that left a small upward movement after the second simulation with the critical thinking skills rated at five. The increase in critical thinking skills was not statistically significant. The role of the nursing faculty during the simulation may be a factor in the students' perspective of their critical thinking skills during the simulation and the debriefing process (Roberts & Greene, 2011). The nursing faculty during this study was not familiar with the simulation debriefing process but had received training in the use of the evaluation tool.

The faculty perspective of the students' critical thinking skills from the C-CEI evaluation during the simulations observed an increase in the students' critical thinking skills during the second simulation. Previous studies (Reilly & Spratt, 2007; Sharpnack & Madigan, 2012), found that faculty observed an increase in student's critical thinking skills after participating in a simulation. The current study found that faculty observed a 1% increase in student's critical thinking after participating in the simulation, supporting the results of other studies.

#### **Hypothesis Four: Self-confidence**

The increase in the individual scores from the SSSCL was not significant enough to reject the null hypothesis; this was related to the *ceiling effect* in the instrument. Students rated the effects of the simulation experience on their self-confidence high; four out of a possible five after the first simulation that left a small upward movement after the second simulation, where they rated self-confidence at five. The increase in their self-confidence was not statistically significant.

Smith (2009) conducted a study to evaluate students' perspective of HFS on satisfaction and self-confidence. The results indicated that the students were satisfied, and their self-confidence was positively affected. The increase in their satisfaction and self-confidence was not statistically significant, and a correlation between the students' perspective and HFS was not proven (Smith, 2009). A study conducted with entry-level nursing students on the impact on self-confidence and clinical competence with HFS indicated an improvement in self-confidence over the semester. No significant correlation with HFS could be determined (Blum et al., 2010). The finding from this study also

indicated a positive effect in the students' self-confidence with their rating of 4 out of 5; no correlation between the students' perspective and HFS existed.

### **Implications for Findings**

The results of the study suggest that simulation may influence novice baccalaureate nursing students nursing knowledge, their performance skills, their critical thinking skills, and their self-confidence to provide safe patient care from the perspective of the faculty. The novice baccalaureate nursing students' perspective of HFS indicated an increase but not large enough for a relationship with their nursing knowledge, performance skills, critical thinking skills, and self-confidence. However, from the faculty perspective, there is an increase in students' skill and critical thinking. These findings suggest that the pretest-posttest and NLN questionnaires tools were not adequate tools to analyze the student's response with the simulation experiences in this study. A systematic review of twelve quantitative studies conducted by Cant and Cooper (2010) indicated simulation was an effective teaching and learning method, with an increase in knowledge, critical thinking, and self-confidence. The sample sizes of the twelve studies ranged from 23 to 140; in six of these studies the sample size ranged from 74 to 140, in three of the studies the sample size ranged from 36 to 58, and three of the studies the sample size was 23 to 27 (Cant & Cooper, 2010). The three studies that were similar in sample size to this study were experimental pretest-posttest studies using a convenience randomized sample with a control group. One experimental study with a control group and a sample size of 58 was a dissertation by Ruggenberg (2008) using HFS and traditional method, testing for knowledge, near transfer, far transfer, active learning, collaboration, and engagement. The results indicated no difference in pretest-posttest for knowledge. Recommendations

include further studies to develop educational outcomes for the students, and add to the increase of knowledge and learning (Ruggenberg, 2008). The results of this study lacked significant findings in nursing knowledge, performance skills, critical thinking skills, and self-confidence. The C-CEI faculty results indicated a statistically significant relationship between students' performance skills and critical thinking skills that can support previous research in the use of HFS as an education method for novice baccalaureate nursing students.

### **Recommendations**

The findings from this study did not provide evidence that a relationship existed between the use of evidence-based HFS and the novice baccalaureate nursing students' development of their nursing knowledge, performance skills, critical thinking skills, and self-confidence. However, studies by Clapper and Kardong-Edgren, (2012), Gates et al. (2010) and O'Donnell, Decker, Howard, Levett-Homes, and Miller (2014) provided evidence that HFS increases practice skills, teamwork, and the transfer of knowledge from theory to clinical. Therefore, additional studies need to be conducted with the novice baccalaureate nursing student that provides conclusive evidence for support HFS as an educational method related to an increase in nursing knowledge, performance skills, critical thinking skills, and self-confidence.

Researchers need to develop additional tools for evaluating nursing knowledge in HFS using NCLEX style questions for quantitative quasi-experimental studies with a moderate sample size of 35 to 45 novice baccalaureate nursing students. These tools need to use the standards of best practice developed in 2013 by the INACSL for simulation as a guide. These standards include the rationale, outcome criteria, and guidelines for

evaluating the relationship of HFS with nursing students. Standard VII: participant assessment and evaluation addresses the use of formative and summative assessments and evaluations of nursing students through simulation. The assessments and evaluations should include the domains of knowledge or cognitive learning, attitude or affective learning, and skills or the psychomotor learning (Sando et al., 2013).

In future studies with HFS as an education method, a pedagogical approach is recommended instead of as a technological tool. Nurse educators need training in the use of simulation as pedagogy for learning; they are unclear about their roles and responsibilities of using simulation for teaching to promote student learning. They need to see simulation as an art as well as a science; HFS is a form of psychodrama or role-playing that is non-threatening for the educator and a learning environment for the student (Roberts & Greene, 2011). The use of simulation experiences by a nursing educator not trained in the pedagogical approach may have resulted in an unexpected finding. In this study, the nurse educator had used simulation as a teaching method only one time and was not familiar with the role she should play in during the simulation. The nurse educator received training in the use of the evaluation tool used in this study and had reviewed a webinar on using debriefing after simulation as a teaching method. This confounding or extraneous variable may have affected the study results.

## **Conclusion**

This study was conducted to investigate whether the use of evidence-based HFS scenarios with novice baccalaureate nursing students during their first clinical course would develop their nursing knowledge, improve their performance skills, develop their critical thinking skills, and develop their self-confidence in order to deliver safe patient

care. This study focused on novice nursing students using communication and assessment skills to collect assessment data before clinical experiences. A quasi-experimental research design was selected to examine the correlation between two groups without a control group. The type of quasi-experimental design selected was a simple interrupted time-series, nonequivalent dependent variables, within-subjects group design (Marczyk, DeMatteo, & Festinger, 2005; Polite & Beck, 2014). Statistical analysis using IBM SPSS 21 paired *t*-test provided the answers to the hypothesis developed from the research question. Simulation may confirm that nursing students are proficient in communication and assessment skills to collect data before clinical experiences.

The results of this study did not accept the alternate hypothesis from the students' perspective, but did support previous study results done by Crouch (2009), Kirkman (2011), and Bowling (2011) in the use of HFS as an educational method for baccalaureate nursing students. These results indicated that HFS may have had an influence but not a significant influence. The data analysis from the faculty perspective supports studies conducted by Reilly and Spratt (2007), a qualitative, focused and case-based pilot study and Sharpnack and Madigan (2012), a quantitative study with 32 sophomore nursing students. These results indicated that HFS had a statistically significant on performance skills and critical thinking skills. The limitations identified for the results of this study include the low reliability of the pretest-posttest and the *ceiling effect* of the NLN questionnaires that evaluated the performance skills, critical thinking skills, and self-confidence from the students' perspective.

Researchers need to use the guidelines presented by the INACSL, for the development of evaluation tools that address the domains of knowledge, attitude, and

skills that will add to the support of simulation as an education method for novice baccalaureate nursing students. The INACSL standards include Rationale, Outcome, Criteria, and Guidelines. Rationale includes the justification for simulation standards for both formative and summative evaluations that evaluate the cognitive, affective, and psychomotor domains. Outcomes include the proposed results of simulation related to simulation standards; formative assessment refers to the improvement of students' performance and summative assessments refer to the students' grades or achievement of objectives. Criteria include the attributes, characteristics, and parameters that meet the outcomes for simulation standards that will assist to validate the results and the reliability of the results. Guidelines include the procedures necessary to meet the simulation standards. Guidelines are not always inclusive; they act as a framework for the policies and procedures of simulation. There are guidelines for formative assessment, summative evaluation, and high-stakes evaluation (Sando et al., 2013).

### **Summary**

The findings in this study represent the students' perspective of HFS influence on their learning and the faculties' observations of HFS influence on the students. The students' perspective indicated that a relationship did not exist between the use of HFS simulation experiences and the development of their nursing knowledge, performance skills, critical thinking skills, or self-confidence. The faculty's perspective indicated that HFS does increase their performance skills and their critical thinking skills.

The limitations and delimitations included the student population size being a convenience sample size of 40 students that limit the generalization of the findings in this study. The criteria for admission in the program will limit the use of these findings for

programs that include other criteria. The time frame for this study was of short duration, only six weeks. The demographic findings included the interpretations related to the generalization of findings.

The findings did not produce evidence that HFS introduced at the novice level for baccalaureate nursing students influenced the development of nursing knowledge, performance skills, critical thinking skills, and self-confidence to deliver safe patient care. Findings from the faculty's perspective did produce evidence that HFS does influence the development of performance skills and critical thinking skills. Researchers need to develop more effective tools to evaluate the results of simulation experiences with novice baccalaureate nursing students. Standards of Best Practice: Simulation was published in 2013 and included Standard VII: Participant Assessment and Evaluation; their recommendations are guidelines for the development of new evaluation tools.

The possible reasons identified for the uncertain results include the low reliability of the pretest-posttest, the *ceiling effect* of the NLN questionnaires that evaluated the performance skills, critical thinking skills, and self-confidence from the students' perspective, and the study design did not allow for the use of a control group. The novice baccalaureate nursing students' perspective of HFS on their nursing knowledge, performance skills, critical thinking skills, and self-confidence indicated an increase but not significantly. The pretest-posttest questions did not relate to the simulation scenario, only to theory content, other studies pretest-posttest questions related to the scenario. Other studies used control groups with their convenience samples; this study did not use a control group. The findings from the students' perspective indicated no significant relationship to support previous research in the use of HFS with novice baccalaureate



nursing students. The finding from the faculty perspective did support previous research in the use of HFS with novice baccalaureate nursing students' performance skills and critical thinking skills.

Further research is needed to support the effect of HFS with novice baccalaureate nursing students, the effects of simulation connecting theory with performance skills and critical thinking skills, and simulations impact on students' self-confidence. Researchers need to use the guidelines developed by the INACLS for the development of evaluation tools that address the domains of knowledge, attitude, and skills. Support for the use of simulation as an education method for novice baccalaureate nursing students is needed.

The faculty evaluation results did indicate that HFS influences the novice baccalaureate nursing students' performance skills and critical thinking skills. The students are novice nursing students who are learning the nursing process and to think like nurses. Not all the students realized the growth that occurred between the first simulation scenario and the second scenario. Students may need instruction on the use of Likert scale ratings. This study could be a guide for conducting additional research with novice baccalaureate nursing students that will add to the support of HFS with novice baccalaureate nursing students.

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Appendix A

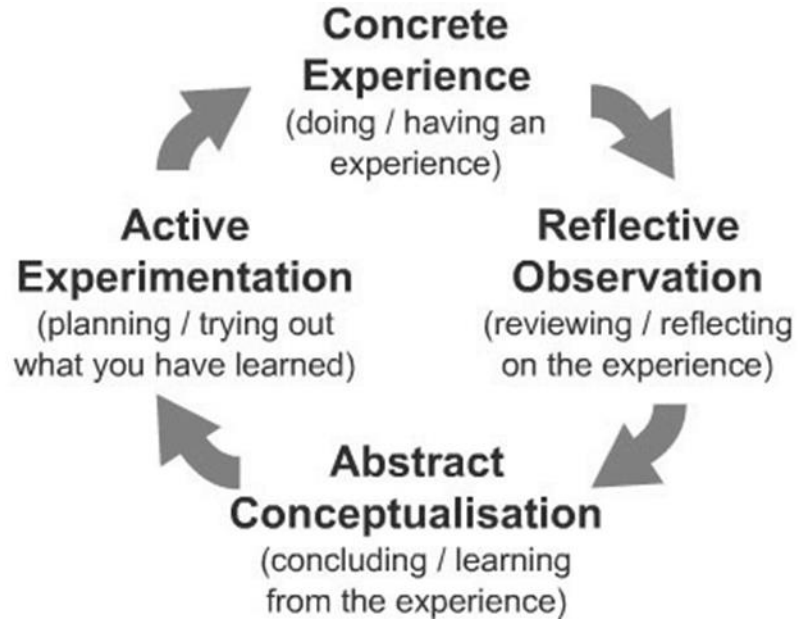


Figure 1 Kolb's Experiential Learning

According to McLeod (2013) Kolb's viewed learning as a combined progression of stages where each stage reinforced learning and lead to the next stage. Learning occurred when all four stages were accomplished. Entry into the learning cycle could be accomplished at any point in the cycle, but all four stages must be completed for learning to occur.

Learning activities are designed to offer the learner the ability to engage in the experience that supports their learning style. Learners can be assisted to learn more successfully by determining their preferred learning styles which can be strengthen through the use of the experiential learning cycle (McLeod, 2013).

## Appendix B

### Simulation Design Scale (Student Version)

In order to measure if the best simulation design elements were implemented in your simulation , please complete the survey below as you perceive it. There are no right or wrong answers, only your perceived amount of agreement or disagreement. Please use the following code to answer the questions.

<p>Use the following rating system when assessing the simulation design elements:</p> <p>1 - Strongly Disagree with the statement                  2 - Disagree with the statement                  3 - Undecided - you neither agree or disagree with the statement                  4 - Agree with the statement                  5 - Strongly Agree with the statement                  NA - Not Applicable; the statement does not pertain to the simulation activity performed.</p>	<p>Rate each item based upon how important that item is to you.</p> <p>1 - Not Important                  2 - Somewhat Important                  3 - Neutral                  4 - Important                  5 - Very Important</p>										
<b>Item</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>NA</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>Objectives and Information</b>											
1. There was enough information provided at the beginning of the simulation to provide direction and encouragement.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2. I clearly understood the purpose and objectives of the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3. The simulation provided enough information in a clear matter for me to problem-solve the situation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4. There was enough information provided to me during the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5. The cues were appropriate and geared to promote my understanding.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<b>Support</b>											
6. Support was offered in a timely manner.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
7. My need for help was recognized.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
8. I felt supported by the teacher's assistance during the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
9. I was supported in the learning process.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

**Simulation Design Scale (Student Version)**

Use the following rating system when assessing the simulation design elements: 1 - Strongly Disagree with the statement 2 - Disagree with the statement 3 - Undecided - you neither agree or disagree with the statement 4 - Agree with the statement 5 - Strongly Agree with the statement NA - Not Applicable; the statement does not pertain to the simulation activity performed.							Rate each item based upon how important that item is to you.  1 - Not Important 2 - Somewhat Important 3 - Neutral 4 - Important 5 - Very Important				
Item	1	2	3	4	5	NA	1	2	3	4	5
<b>Problem Solving</b>											
10. Independent problem-solving was facilitated.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
11. I was encouraged to explore all possibilities of the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
12. The simulation was designed for my specific level of knowledge and skills.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
13. The simulation allowed me the opportunity to prioritize nursing assessments and care.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
14. The simulation provided me an opportunity to goal set for my patient.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<b>Feedback/Guided Reflection</b>											
15. Feedback provided was constructive.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
16. Feedback was provided in a timely manner.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
17. The simulation allowed me to analyze my own behavior and actions.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
18. There was an opportunity after the simulation to obtain guidance/feedback from the teacher in order to build knowledge to another level.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<b>Fidelity (Realism)</b>											
19. The scenario resembled a real-life situation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
20. Real life factors, situations, and variables were built into the simulation scenario.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5



## Appendix C

### Student Satisfaction and Self-Confidence in Learning

**Instructions:** This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your simulation activity. Each item represents a statement about your attitude toward your satisfaction with learning and self-confidence in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:

- 1 = STRONGLY DISAGREE with the statement
- 2 = DISAGREE with the statement
- 3 = UNDECIDED - you neither agree or disagree with the statement
- 4 = AGREE with the statement
- 5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	SD	D	UN	A	SA
1. The teaching methods used in this simulation were helpful and effective.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
3. I enjoyed how my instructor taught the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
4. The teaching materials used in this simulation were motivating and helped me to learn.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
5. The way my instructor(s) taught the simulation was suitable to the way I learn.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
Self-confidence in Learning	SD	D	UN	A	SA
6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
7. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
9. My instructors used helpful resources to teach the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
10. It is my responsibility as the student to learn what I need to know from this simulation activity.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
11. I know how to get help when I do not understand the concepts covered in the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
12. I know how to use simulation activities to learn critical aspects of these skills.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time..	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

## Appendix D

### Educational Practices Questionnaire (Student Version)

In order to measure if the best practices are being used in your simulation, please complete the survey below as you perceive it. There are no right or wrong answers, only your perceived amount of agreement or disagreement. Please use the following code to answer the questions.

<p>Use the following rating system when assessing the educational practices:</p> <ul style="list-style-type: none"> <li>1 - Strongly Disagree with the statement</li> <li>2 - Disagree with the statement</li> <li>3 - Undecided - you neither agree or disagree with the statement</li> <li>4 - Agree with the statement</li> <li>5 - Strongly Agree with the statement</li> <li>NA - Not Applicable; the statement does not pertain to the simulation activity performed.</li> </ul>	<p>Rate each item based upon how important that item is to you.</p> <ul style="list-style-type: none"> <li>1 - Not Important</li> <li>2 - Somewhat Important</li> <li>3 - Neutral</li> <li>4 - Important</li> <li>5 - Very Important</li> </ul>																																																																																																																																																
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 65%;">Item</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>NA</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;"><b>Active learning</b></td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="text-align: left;">1. I had the opportunity during the simulation activity to discuss the ideas and concepts taught in the course with the teacher and other students.</td> <td><input type="radio"/> 1</td><td><input type="radio"/> 2</td><td><input type="radio"/> 3</td><td><input type="radio"/> 4</td><td><input type="radio"/> 5</td><td><input type="radio"/> NA</td> <td><input type="radio"/> 1</td><td><input type="radio"/> 2</td><td><input type="radio"/> 3</td><td><input type="radio"/> 4</td><td><input type="radio"/> 5</td> </tr> <tr> <td style="text-align: left;">2. 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**Educational Practices Questionnaire (Student Version)**

Use the following rating system when assessing the educational practices: 1 - Strongly Disagree with the statement 2 - Disagree with the statement 3 - Undecided - you neither agree or disagree with the statement 4 - Agree with the statement 5 - Strongly Agree with the statement NA - Not Applicable; the statement does not pertain to the simulation activity performed.							Rate each item based upon how important that item is to you. 1 - Not Important 2 - Somewhat Important 3 - Neutral 4 - Important 5 - Very Important				
Item	1	2	3	4	5	NA	1	2	3	4	5
<b>Collaboration</b>											
11. I had the chance to work with my peers during the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
12. During the simulation, my peers and I had to work on the clinical situation together.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<b>Diverse Ways of Learning :</b>											
13. The simulation offered a variety of ways in which to learn the material.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
14. This simulation offered a variety ways of assessing my learning.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
<b>High Expectations</b>											
15. The objectives for the simulation experience were clear and easy to understand.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5
16. My instructor communicated the goals and expectations to accomplish during the simulation.	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5	<input type="radio"/> NA	<input type="radio"/> 1	<input type="radio"/> 2	<input type="radio"/> 3	<input type="radio"/> 4	<input type="radio"/> 5

Appendix E



Creighton Competency Evaluation Instrument (C-CEI)

Student(s) Name:	0= Does not demonstrate competency 1= Demonstrates competency NA= Not applicable	Date: ____/____/____
Scenario:		
Evaluator:		
<b>ASSESSMENT</b>	Grade Appropriate Score for all Applicable Criteria If not applicable, circle NA	<b>COMMENTS:</b>
1. Obtains Pertinent Data	0 1 NA	
2. Performs Follow-Up Assessments as Needed	0 1 NA	
3. Assesses the Environment in an Orderly Manner	0 1 NA	
<b>COMMUNICATION</b>		
4. Communicates Effectively with Intra/Interprofessional Team (TeamSTEPPS, SBAR, Written Read Back Order)	0 1 NA	
5. Communicates Effectively with Patient and Significant Other (verbal, nonverbal, teaching)	0 1 NA	
6. Documents Clearly, Concisely, & Accurately	0 1 NA	
7. Responds to Abnormal Findings Appropriately	0 1 NA	
8. Promotes Professionalism	0 1 NA	
<b>CLINICAL JUDGMENT</b>		
9. Interprets Vital Signs (T, P, R, BP, Pain)	0 1 NA	
10. Interprets Lab Results	0 1 NA	
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0 1 NA	
12. Prioritizes Appropriately	0 1 NA	
13. Performs Evidence Based Interventions	0 1 NA	
14. Provides Evidence Based Rationale for Interventions	0 1 NA	
15. Evaluates Evidence Based Interventions and Outcomes	0 1 NA	
16. Reflects on Clinical Experience	0 1 NA	
17. Delegates Appropriately	0 1 NA	
<b>PATIENT SAFETY</b>		
18. Uses Patient Identifiers	0 1 NA	
19. Utilizes Standardized Practices and Precautions Including Hand Washing	0 1 NA	
20. Administers Medications Safely	0 1 NA	
21. Manages Technology and Equipment	0 1 NA	
22. Performs Procedures Correctly	0 1 NA	
23. Reflects on Potential Hazards and Errors	0 1 NA	
<b>COMMENTS</b>		
		Total: _____ Total Applicable Items: _____

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 For more information, please contact Martha Todd, MS, APRN @ mtodd@creighton.edu

Revised 4/22/2014



**Informed Consent**

**HIGH-FIDELITY SIMULATION INFLUENCES ON NOVICE BACCALAUREATE  
NURSING STUDENTS**

I have been informed about the nature of this study, and I voluntarily agree to participate in this study. I also give my consent that any data from the Pretest-posttest, the NLN survey instrument, and the C-CEI evaluation collected as a result of my participation in this study may be used for educational and/or scientific purposes.

I understand that the responses I give will be considered confidential, reported only as group data, and that every possible effort will be made to preserve my confidentiality regarding this data. I will develop a random identification number at the beginning of the study for use on all my test and survey instruments. This identification number will not be connected with my name.

I understand that I am free to discontinue my participation at any time will notify the researcher of intent to withdraw and provide researcher with the correct identifier code for removal of collected data without penalty. I understand that none of my legal rights regarding negligence and the liability of Millikin University or its agents have been waived. I understand that any questions I have regarding the study, I can contact Prof. Barbara Connelley by phone at Redacted by email at Redacted or Redacted. I understand that I will be given a copy of this consent form to keep, and the researcher will keep another copy on file.

I affirm that I have read this entire statement, and that I have been given an opportunity to ask any questions I may have regarding this form and this study.

Participant's Name Printed

Participant's Signature

---

Signature of Person Obtaining Consent and Title

(PI= Principal Investigator, CO=Co-investigator, RA= Research Assistant)

Consent form valid until:

(IRB will provide date)

## Appendix G

### Permission to use NLN Questionnaires

#### Regarding: Request for NLN Survey Instruments

**From:** Nasreen Ferdous [Redacted]  
**To:** [Redacted]  
**Date:** Thursday – November 29, 2012 11:14 AM  
**Subject:** Regarding: Request for NLN Survey Instruments  
TEXT.htm; image001.gif; Instrument 1\_Educational Practices  
Questionnaire.pdf; Instrument 2\_Satisfaction and Self Self-  
**Attachments:** confidence in Learning .pdf; Instrument 3\_Simulation Design  
Scale.pdf; Mime.822

It is my pleasure to grant you permission to use the “Educational Practices Questionnaire,” “Simulation Design Scale” and “Student Satisfaction and Self-confidence in Learning” NLN/Laerdal Research Tools. In granting permission to use the instruments, it is understood that the following assumptions operate and “caveats” will be respected:

1. It is the sole responsibility of (you) the researcher to determine whether the NLN questionnaire is appropriate to her or his particular study.
2. Modifications to a survey may affect the reliability and/or validity of results. Any modifications made to a survey are the sole responsibility of the researcher.
3. When published or printed, any research findings produced using an NLN survey must be properly cited as specified in the Instrument Request Form. If the content of the NLN survey was modified in any way, this must also be clearly indicated in the text, footnotes and endnotes of all materials where findings are published or printed.

I am pleased that material developed by the National League for Nursing is seen as valuable as you evaluate ways to enhance learning, and I am pleased that we are able to grant permission for use of the “Educational Practices Questionnaire,” “Simulation Design Scale” and “Student Satisfaction and Self-confidence in Learning” instruments.

Nasreen Ferdous | Administrative Coordinator for Grants/R&PD | National League for Nursing | [www.nln.org](http://www.nln.org)  
[nferdous@nln.org](mailto:nferdous@nln.org) | Phone: 212-812-0315 | Fax: 212-812-0391 | 61 Broadway | New York, 10006

## Appendix H

### Permission to use C-CEI

Simulation Evaluation Instrument

<https://www.blueq-surveys.creighton.edu/se.aspx?s=405EEEF72FF1>

## Simulation Evaluation Instrument



#### Name.

Last Name Connelley  
First Name Barbara  
Credentials MSN, RN

#### Institution affiliated with:

Institution Name Millikin University  
Address: 1184 W. Main St.  
City: Decatur  
State (or country if outside the U.S.) IL  
Zip Code/Postal Code: 62522  
Phone: Redacted

#### Question Text

Email Address bconnelley@millikin.edu

#### How do you plan to use the C-CEI? (Click all that Apply)

- Research
- Student competency
  - Staff competency
  - Master's thesis
  - DNP project
- PhD dissertation
- Other

If using for "Other" please explain.

Please explain for "other" use:

Please use the below area to address any questions you have or to provide additional information if desired.

My PhD dissertation is titled High-Fidelity Influence on Novice Baccalaureate Nursing Students. I am using my current teaching facility for my research subjects and I chose your evaluation tool because it did address the QSEN and AACNE competencies for nursing used by this school of nursing. Thank you for providing access to your tool and providing online training.

**Agreement for use of the Creighton Competency Evaluation Instrument (C-CEI).**  
I understand that I have been granted permission by the creators of the C-CEI® to use the C-CEI® for academic and/or research purposes.

I confirm that I will complete the required training prior to use of the C-CEI®. In addition, I agree that all individuals working with the C-CEI® will also complete the required training prior to using the instrument.

I agree that I will use the C-CEI® only for its intended use, and will not alter the C-CEI® in any way.

I understand that I may be asked to share results on any validity or reliability data as determined with the creators of the C-CEI®.

I agree

**Submit Survey** >

[View survey software](#)



## Appendix I



### Introduction Letter

Dear NU 202 Students:

My name is Prof. Barbara Connelley and I am a graduate student at the University of Phoenix working on a PhD in nursing degree. I am doing a research study entitled high-fidelity simulation influences on novice baccalaureate nursing students. The purpose of the research study is to determine if the use of evidence-based high-fidelity simulation scenarios with novice baccalaureate nursing students in their first clinical course will develop their nursing knowledge, improve their skills, develop their critical thinking skills, and develop self-confidence to deliver safe patient care. Your participation will involve the completion of three NLN questionnaires during the debriefing session after your participation in the simulation scenario. This will take about 15 to 20 minutes after the debriefing session. You can decide to be a part of this study or not. Once you start, you can withdraw from the study at any time without any penalty. The results of the research study may be published but your identity will remain confidential and your name will not be made known to any outside party.

In this research, there are no risks to you and although there may be no direct benefit to you, a possible benefit from your being part of this study is that it will add to the knowledge supporting the use of evidence-based High-fidelity simulation scenarios with novice baccalaureate nursing students.

If you have any questions about the research study, please call me, or stop by my office. Contact information is on your course syllabus and the Informed Consent form. For questions about your rights as a study participant, or any concerns or complaints, please contact the University of Phoenix Institutional Review Board via email at [IRB@phoenix.edu](mailto:IRB@phoenix.edu). Millikin University School of Nursing has given their consent for the conduction of this research study.

As a participant in this study, you should understand the following:

1. You may decide not to be part of this study or you may want to withdraw from the study at any time. If you want to withdraw, you can do so without any problems.
2. Your identity will be kept confidential.
3. Data will be kept in a secure and locked area. The data will be kept for three years, and then destroyed.
4. The results of this study may be published.

By signing the attached Informed Consent, you agree that you understand the nature of the study, the possible risks to you as a participant (none), and how your identity will be kept confidential. When you sign the Informed Consent it means that you are 18 years old or older and that you give your permission to volunteer as a participant in the study that is described.

Thank you for considering being a participant.

Prof. B. Connelley MSN, RN  
Nursing Instructor  
Millikin University  
School of Nursing

## Appendix J

### Demographic Information

Identifier Code \_\_\_\_\_

Gender

Male\_\_\_

Female\_\_\_

Race

Hispanic\_\_\_

Black\_\_\_

Caucasian\_\_\_

Other\_\_\_

Age

18-20\_\_\_

21-25\_\_\_

26-30\_\_\_

31-35\_\_\_

Over 35\_\_\_

Check all that apply:

Hold degree in other field\_\_\_

Participated in another nursing course\_\_\_

First nursing course\_\_\_

CNA\_\_\_

Appendix K



PREMISES, RECRUITMENT AND NAME (PRN) USE PERMISSION

Millikin University

Name of Facility, Organization, University, Institution, or Association

Please complete the following by check marking any permissions listed here that you approve, and please provide your signature, title, date, and organizational information below. If you have any questions or concerns about this research study, please contact the University of Phoenix Institutional Review Board via email at IRB@phoenix.edu.

I hereby authorize Barbara Connelley, a student of University of Phoenix, to use the premises (facility identified below) to conduct a study entitled High-fidelity simulation influences on novice baccalaureate nursing students.

I hereby authorize Barbara Connelley, a student of University of Phoenix, to recruit subjects for participation in a study entitled High-fidelity simulation influences on novice baccalaureate nursing students.

I hereby authorize Barbara Connelley, a student of University of Phoenix, to use the name of the facility, organization, university, institution, or association identified above when publishing results from the study entitled High-fidelity simulation influences on novice baccalaureate nursing students.

*with subsequent approval of Millikin's IRB prior to the study*

Redacted  
Signature

7/17/14  
Date

Redacted

Name  
Director, School of Nursing

Title

Address of Facility  
1184 West Main St.  
Decatur, IL 62522