2021

Effects of Multilayered Simulation on Skill Acquisition in Associate Degree Nursing

Rikki Meshone Murff
Walden University

Walden University

College of Health Professions

This is to certify that the doctoral dissertation by

Rikki Murff

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Edna Hull, Committee Chairperson, Nursing Faculty
Dr. Deborah Lewis, Committee Member, Nursing Faculty
Dr. Eileen Fowles, University Reviewer, Nursing Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2021

Abstract

Effects of Multilayered Simulation on Skill Acquisition in Associate Degree Nursing Students

by

Rikki Murff

MSN, Grambling State University, 2010

BSN, Grambling State University, 2001

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Nursing

Walden University

May 2021

Abstract

There is a demand for an overhaul of undergraduate nursing education curricula to better prepare students who can provide safe, quality care in an increasing complex health care system. Simulation use has provided an avenue for nurse educators to consider when deciding appropriate and reliable teaching and learning strategies to guide students with little attention given to the effectiveness of novel approaches such as multilayered simulation. The aim of this study was to examine the use of multilayered simulation as an effective teaching method in nursing education. Kolb's theory of experiential learning was used to guide this study. A quantitative, posttest-only design was employed to determine the effects of multilayered simulation when compared to the effects of a more traditional approach, specifically demonstration/return demonstration. Twenty-three first-year nursing students enrolled in a fundamentals course in an associate degree nursing program with no experience on how to obtain blood pressure measurements participated in this study. Participants were divided into two groups: a control group receiving a faculty-led demonstration on blood pressure measurement and an experimental group receiving multilayered simulation. Data were collected using a 29-item check-off tool with closed-ended, "met" or "not met" items. An independent samples *t* test and Bland Altman plots were used to analyze the resulting data. Although not statistically significant, data yielded comparable, accurate blood pressure measurements from both groups. Findings from this study have the potential to influence positive social change in nursing education by facilitating the integration of teaching strategies, like multilayered simulation, into undergraduate nursing education curricula.

Effects of Multilayered Simulation on Skill Acquisition in Associate Degree Nursing Students

by

Rikki Murff

MSN, Grambling State University, 2010

BSN, Grambling State University, 2001

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Nursing

Walden University

May 2021

Dedication

This dissertation is dedicated to my daughter, Zoe. She was nine years old when I started this doctoral program. She is now 16 and has been a cheerleader for me throughout this entire experience. A special feeling of gratitude to my loving parents, Larry and Janice, and my brother, Kevin. You all were my backbone from the beginning. You were there whenever I needed you. I could not have completed this journey without you.

I also dedicate this dissertation to my close friends, Kim, Chatorria, Mykeisha, and Myla. You have supported me unconditionally throughout this process. I appreciate the many words of encouragement and unyielding support.

Acknowledgments

I wish to thank my committee members who liberally provided their knowledge and valuable time. A special thanks to Dr. Edna Hull, committee chairperson for her immeasurable hours of reading, reflection, direction, and encouragement throughout this entire process. Thank you, Dr. Deborah Lewis and Dr. Eileen Fowles for agreeing to serve on my committee. Your support and willingness to provide feedback made the completion of this dissertation a gratifying journey.

I would also like to thank my work institution for allowing me to conduct my research in the school of nursing. Special thanks goes to the faculty of the nursing of fundamentals course for their generous assistance and eager cooperation.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

While literature on the use of simulation in nursing education has grown exponentially over the years, little attention has been given to its effectiveness when compared to multilayered simulation. In its broadest sense, simulation is defined as a teaching strategy grounded in learning theory that replicates aspects of real-world experiences in a safe environment (Aebersold, 2018; Bland et al., 2011). In contrast, multilayered simulation is defined as the simultaneous utilization of varying, physical, multiple fidelities of simulation (Schlicher & Eyck, 2008). With more nursing programs adopting simulation into the nursing curriculum, the question that motivated this study was: Which teaching strategy is more effective in achieving student outcomes? The focus of this study was to examine the effects of utilizing multilayered simulation in helping first-year nursing students obtain accurate blood pressure measurements when compared to the effects of more traditional methods, specifically demonstration/return demonstration. I found no current research comparing the differences between these teaching approaches. Novel approaches, such as multilayered simulation, should be explored to help further integrate simulation into the clinical curricula of nursing education. The findings of this study have the potential for promoting positive social change through promoting the use of a teaching strategy that can provide effective skill acquisition. More specifically, the findings from this study support nursing education and the nursing profession by reinforcing the need for further integration of simulation into nursing curricula and preparing nursing students to provide quality, safe patient care.

Chapter 1 of this study serves as the introduction and includes background information on the research problem along with the problem statement and purpose of the study. The chapter also contains the research question and corresponding hypotheses, theoretical framework, and research design. The chapter ends with a discussion of the assumptions, scope, and delimitations of the study along with limitations and the significance of the study.

Background

As reported by Benner et al., (2010) and reinforced by the Institute of Medicine, (2010), there is a need for nursing curricula to be revised and revamped so that nursing students can be better prepared to provide nursing care to patients with complicated needs and function appropriately within a complex health care system. Several studies have shown that simulation can be used as an appropriate teaching strategy (Lewis & Ciak, 2011; Skrable & Fitzsimons, 2014; Wane & Lotz, 2013). However, one problem related to current and future practice is how to utilize available teaching methods that will introduce the knowledge, skills, and attitudes today's population of nursing students need to deliver quality safe care in an approach that leads to knowledge acquisition and informed clinical decisions. Nurse educators are increasingly using simulation as a teaching strategy with students learning principles of nursing science in a safe environment (Aebersold, 2018).

Simulation is a teaching and learning strategy that can be integrated into the core curricula of nursing education for all levels of nursing (Aebersold, 2018). The growing acceptance of simulation as an effective teaching strategy in nursing education has been

examined by multiple scholars (Lewis & Ciak, 2011; Skrable & Fitzsimons, 2014; Wane & Lotz, 2013). Goodstone et al. (2013) and Cant and Cooper (2017) addressed the evidence regarding the use of simulation when compared to other strategies for critical thinking enhancement finding that simulation instructional methods helped increase critical thinking skills. Norman et al. (2012) and Schlicher and Eyck (2008) provided evidence that further research is needed on multilayered simulation as a teaching strategy. The use of multilayered simulation and its effectiveness in supporting student learning is an underexplored topic in the literature. Therefore, I conducted this study to examine the effectiveness of multilayered simulation in nursing education and to address an obvious gap in literature.

Problem Statement

Although there is a proliferation of literature addressing the use of simulation as a teaching strategy in nursing education, little information has been reported on the use of multilayered simulation in nursing education (Gharaibeh et al., 2017). Studies on simulation have largely focused on student and/or faculty perceptions of the teaching strategy. Nursing education has been called to transform its current curricula and practices to meet the demanding and ever-changing complexities and needs regarding patient care in the 21st century (Institute of Medicine, 2010). One way that nursing education is transforming the delivery of fundamental competencies and skills needed for current patient care is through the use of simulation (Cook, 2015). The surge of usage of this technique has led to several studies that examined the utilization of simulation as a teaching strategy that may assist nursing students in improving critical-thinking skills

(Lewis & Ciak, 2011; Skrable & Fitzsimons, 2014; Wane & Lotz, 2013). Several studies were also conducted that examined the differences of simulation when compared to traditional teaching strategies (Goodstone et al., 2013; Shin et al., 2015). Findings from previous research also identified a variety of situations in which simulation can be utilized in nursing education to enhance knowledge acquisition (Cant & Cooper, 2017; Foronda et al., 2013).

Multilayered simulation involves the concurrent use of multiple fidelities of simulation (Schlicher & Eyck, 2008). Examples of low-fidelity simulation include computer-based simulation, task trainers, and virtual patient simulation that provide little or no physical interactivity (Li, 2007). High-fidelity simulation includes the use of human patient simulators or standardized patients that provide an interactive experience without the risk of actual patient harm (Li, 2007). Layered simulation involves the utilization of at least one event of each low- and high-fidelity simulation together as a teaching and learning strategy (Schlicher & Eyck, 2008). The need for further research in the use of layered simulation as an effective teaching strategy has also been supported by other health care disciplines (Norman et al., 2012; Schlicher & Eyck, 2008).

Purpose of the Study

Recognizing the lack of research addressing multilayered simulation, the primary purpose of this study was to investigate how multilayered simulation, in comparison to the traditional teaching method of demonstration/return demonstration, may affect the skill acquisition of blood pressure measurements by first-year nursing students in an

associate degree fundamentals course. In this quantitative study, I employed an experimental, posttest-only, comparison design.

Research Question

The primary research question and corresponding hypotheses guiding this study were: What are the effects of multilayered simulation on the skill acquisition of obtaining accurate blood pressure measurements for first-year associate degree nursing (ASN) students in a fundamentals of nursing course when compared to the traditional teaching method of demonstration/return demonstration?

H_0: There is no significant difference in the effects of layered simulation on the skill acquisition of obtaining accurate blood pressure measurements when compared to the traditional teaching method of demonstration/return demonstration.

H_1: There is a significant difference in the effects of layered simulation on the skill acquisition of obtaining accurate blood pressure measurements when compared to the traditional teaching method of demonstration/return demonstration.

Theoretical Framework

Kolb's theory of experiential learning served as the theoretical lens guiding this study. Patient acuity in acute care settings requires nursing care that is consistent with growing demands and complexities (Benner et al., 2010). In nursing education, the use of simulation is rising as a teaching strategy that can be used in a safe environment. Kolb's experiential learning theory, first noted in 1984, is concentrated on learning conditions

(McEwen & Wills, 2014). It involves two layers: a four-stage learning cycle and four separate learning styles (Kolb & Fry, 1975). In this study, I focused on Kolb's four-stage learning cycle. In the theory, Kolb (1984) postulated that a four-stage learning cycle can be used to increase knowledge and skill acquisition. The first stage in the cycle involves creating a concrete experience for the learner, such as in the case of this study, the multilayered simulation experience or the instructor-based demonstration (see Kolb & Fry, 1975). The second stage of Kolb's learning cycle is reflective observation in which the learner begins to collect information and observations regarding the experience (Kolb & Fry, 1975). During the third stage, abstract conceptualism, the learner begins to analyze and draw conclusions from the data and observations that were collected. The final stage, active experimentation, allows the learner to apply conclusions in new situations. Kolb and Fry (1975) postulated that "learning and change result from the integration of concrete emotional experiences with cognitive processes: conceptual analysis and understanding" (p. 34). A more detailed discussion of the significance of Kolb's experiential learning theory will be presented in Chapter 2.

This study aligned with Kolb's four-stage learning cycle in that each stage was reflected in the phases of this study. The first stage of Kolb's learning cycle, concrete experience, was demonstrated in the first phase of this study that allowed for treatment. The participants were divided into two groups: one treatment and one control group. The participants had either a computer-assisted simulation experience followed by a mid- to high-fidelity simulation experience or a traditional lecture experience that included a faculty-led active demonstration on how to correctly measure blood pressure. The second

and third stages in Kolb's learning cycle are reflective observations and abstract conceptualism, respectively (McLeod, 2017). After participants were introduced to the initial experience, they were allowed to reflect upon the experience and conceptualize the learning that has been acquired. The final stage in Kolb's learning cycle is active experimentation (McLeod, 2017). Students from both groups were actively engaged in measuring blood pressure readings to examine if the skill had been appropriately acquired. I hypothesized that through concrete experience and the participants' subsequent reflective observations and conceptualism, first-year ASN students utilizing multilayered simulation would be able to more accurately obtain blood pressure measurements in comparison to the students learning through the traditional method of demonstration/return demonstration.

Nature of the Study

In this study, I used a quantitative approach with an experimental, posttest-only, comparison design. In quantitative research, the concepts/variables presented in the study are empirically explored and calculated using a consistent and authenticated tool (Creswell, 2009). The Blood Pressure Skills Check-Off tool utilized in this study was a modified version of the tool originally developed by faculty of the school of nursing. Quantitative research allows for statistical scrutiny of the relationship of the variables presented in the study (Rudestam & Newton, 2015). The independent variable for this study was multilayered simulation, while the dependent variable was the skill acquisition of obtaining accurate blood pressure measurements. It was not feasible to measure the dependent variable before treatment was applied, so the posttest-only design was the

most appropriate approach (see Frankfort-Nachmias & Nachmias, 2008). Data were collected from a demonstration on the accuracy of obtaining blood pressure readings from first-year ASN students.

Definitions

Demonstration: A method of teaching that sequentially shows the learner how to complete a skill (Chhugani & James, 2017). For the purposes of this study, demonstration was when nursing faculty performed the procedure for obtaining accurate blood pressure measurements to participants.

Multilayered simulation: The concurrent use of multiple fidelities of simulation (Schlicher & Eyck, 2008). For the purposes of this study, multilayered simulation was the concurrent use of a low-fidelity, computer-simulated program along with a high-fidelity mannequin to assist in the acquisition of obtaining accurate blood pressure measurements.

Return demonstration: An instructional strategy by which the student tries to complete a psychomotor skill, with signals as needed from the teacher (Bastable, 2003). For the purposes of this study, return demonstration was when participants performed the procedure for obtaining accurate blood pressure measurements.

Simulation: A teaching strategy that assists the student in engaging in realistic patient care scenarios while incorporating theoretical principles and an opportunity for feedback (Bland et al., 2011). For the purposes of this study, simulation was the use of an experiential learning strategy that assists students in learning the method for measuring blood pressure.

Skill acquisition: A multidimensional learning experience through which psychomotor skills are enhanced through cognitive processes (Billings & Halstead, 2009). For the purposes of this study, skill acquisition was the precise interpretation of the systolic and diastolic measurements utilizing the auscultation method; this ratio level variable was measured utilizing the Bland-Altman method (see Giavarina, 2015) for assessing agreement between two methods of clinical measurement.

Assumptions

Assumptions are assertions that are considered accurate and are often inferred (Groves et al., 2013). In research studies, assumptions are rooted in the study's design, framework, analysis of findings, and interpretations. The following assumptions are listed to influence the lucidity and rigor of this research study (see Groves et al., 2013). In this study, I assumed:

1. Multilayered simulation and layered simulation are often used interchangeably in the literature.
2. All participants were first-year nursing students with no prior knowledge of how to obtain blood pressure measurements.
3. All participants responded honestly and respectfully.

Scope and Delimitations

The sample used in this study were first-year ASN students who had not been introduced to the skill of obtaining blood pressure measurements in an ASN program. It is during this time frame (i.e., the first year of the ASN program) that students are introduced to the basic skill of blood pressure measurement. Students who had already

acquired the skill of accurately obtaining blood pressure measurements in an ASN program could have been labelled as extrinsic factors and jeopardized the internal validity of this study and, therefore, were excluded. Extrinsic factors are factors that can occur before the study is underway that may jeopardize internal validity (Frankfort-Nachmias & Nachmias, 2008). The sample was representative of the population of students who are first-year ASN students in order to ensure the external validity of this study (see Frankfort-Nachmias & Nachmias, 2008).

Limitations

One limitation of this study is that the sample came from one institution. The participants were randomly assigned to the experimental and the control group. Both groups possessed similar characteristics to control for issues of internal validity. An assumption of this research study was that no participants had prior knowledge on how to obtain blood pressure measurements in an ASN program. With no previous knowledge to examine, I used a posttest-only with a comparison group research design was utilized for this study. A major limitation involving this design is the absence of a pretest; therefore, there is no direct avenue to measure a link between treatment and change (Groves et al., 2013). Another limitation involving this design was noted in the selection process. Comparison groups are not usually chosen by random methods, which may lead to nonequivalent groups (Groves et al., 2013). Utilizing a posttest-only control group design with randomly assigned groups addressed intrinsic sources by exposing both groups, except the treatment, to the same events (Frankfort-Nachmias & Nachmias, 2008).

The site where this research study took place was my own institution of employment. I recognized that potential biases could have been perceived as a result of performing "backyard research." Backyard research is defined as research that is performed where the researcher may have a personal stake either with the site or with the participants involved (Creswell as cited by Hull, 2017). Improvement in academic programs, personal achievement, and improved student learning outcomes are just a few of the merits associated with site-based research (Hull, 2017). During the planning stages of this study, I anticipated consequences that could have arisen as a result of performing backyard research like disturbing the natural flow of activities in the setting or deciding ownership of collected data (see Creswell, 2009). Issues regarding participatory and institutional consent as well as the issue of reciprocity were also considered.

One strategy that is often utilized for addressing limitations is to identify and minimize them before beginning the study (Groves et al., 2013). First, I took steps to ensure that permission to perform research at this site was obtained from my home institution and Walden University's Institutional Review Board (IRB). Second, consent was obtained from every participant. Explicit explanations were given to each participant defining the goal of the research and the role of participants in the study. I did not use coercion or force when attempting to gain participation from nursing students. Additionally, this research, in no way, influenced the outcome of the students' matriculation through this school of nursing. Another strategy I used to address this limitation was the inclusion of a noncoercive disclaimer in the consent form with an

option to withdraw from the study at any time to help facilitate accurate results from participants (see Groves et al., 2013).

Significance

This study filled a gap in the literature by examining the effects of multilayered simulation as it is used in nursing education. This project was unique because it addressed an area in simulation that is underexplored even though simulation is increasingly being accepted as an effective teaching strategy (see Gharaibeh et al., 2017). The findings from this study add to the body of knowledge by identifying the effects of layered simulation as a teaching and learning strategy in nursing education. The findings support positive social change by introducing a teaching strategy that can be utilized to provide effective skill acquisition. The findings also support positive social change in nursing education and, subsequently, the nursing profession, by providing evidence that supports the use of multilayered simulation as an effective teaching strategy. Implementing multilayered simulation into nursing curricula will allow nursing students to engage in experiential learning experiences that allow them to practice nursing care safely while improving their clinical judgement, which ultimately will lead to an improvement in patient care outcomes.

Summary

Nursing education must undergo changes in order to meet current health care demands. Several studies have already provided evidence that simulation can be an effective strategy in nursing education and showed that simulation has been utilized in a variety of ways to enhance skill acquisition. Multilayered simulation is another way in

which simulation can be utilized to assist the nursing student in acquiring skills appropriately.

Using Kolb's experiential learning theory as a theoretical lens, in this study I examined the effects of multilayered simulation in assisting first-year ASN students in the skill acquisition of obtaining accurate blood pressure measurements. The findings supported positive social change by introducing another effective simulation strategy to nursing education. Literature that addressed the constructs, methodology, and theoretical foundation are reviewed in Chapter 2.

Chapter 2: Literature Review

The purpose of this research study was to examine the effects of utilizing layered simulation in assisting first-year nursing students obtain accurate blood pressure measurements when compared to the effects of more traditional methods, specifically demonstration/return demonstration. Nurse educators are confronted with the task of effectively preparing students for the challenge of caring for patients with complex health care demands (Institute of Medicine, 2010; Todd et al., 2008). Traditional teaching strategies, such as demonstration/return demonstration for example, may be insufficient in delivering the knowledge needed to prepare current diverse student populations to provide appropriate health care (Hurst, 2016; Kapucu, 2017). This task is made even more challenging with the reduced number of clinical sites available for practice (American Association of Colleges of Nursing, 2017). Simulation use has provided an avenue for nurse educators to consider when deciding on appropriate and reliable teaching and learning strategies needed to guide students (Cook, 2015). The use of simulation has surged in the past decade alone. Several earlier studies have been undertaken that provide evidence that simulation can be used as an appropriate teaching strategy (Lewis & Ciak, 2011; Skrable & Fitzsimons, 2014; Wane & Lotz, 2013). There are also several studies that explore the differences between simulation and traditional teaching strategies (Goodstone et al., 2013; Shin et al., 2015). Researchers have also recognized diverse opportunities in which simulation can be incorporated in nursing education to improve the acquisition of knowledge and skills (Cant & Cooper, 2017; Foronda et al., 2013).

While there has been an abundance of literature reporting the use of simulation as an effective teaching strategy, few studies have been published on the use of layered simulation as a teaching strategy in nursing education (Gharaibeh et al., 2017). Layered simulation involves the contemporaneous use of several fidelities of simulation (Schlicher, 2008; Schlicher & Eyck, 2008). More precisely, layered simulation involves the utilization of at least two different types of simulation used together as a teaching and learning strategy (Schlicher & Eyck, 2008). The necessity for additional research on the use of layered simulation has also been endorsed by other health care disciplines (Norman et al., 2012; Schlicher & Eyck, 2008).

This chapter serves as a comprehensive review of the literature addressing the topic of multilayered simulation. The chapter includes a detailed search strategy, an explanation of Kolb's experiential learning theory as the theoretical framework guiding this study, and review of studies addressing key variables crucial to the undertaking of this research. I end the chapter with a summary statement identifying the gap in literature supporting the need for this study.

Literature Search Strategy

I obtained the literature for this comprehensive review from peer-reviewed journals: nursing journals, journals of other health care professionals, and educational journals from nursing and other fields. The following databases were used to search for relevant research and journal articles: CINAHL, ERIC, ProQuest, PsycINFO, Medline, PubMed, and Ovid. Scholarly documents were also located in Walden University's dissertation library database. I also reviewed several books for scholarly information on

the topic. Internet searches and the reference lists of other related materials were also used to find material for this literature review. I used the following search keyword search terms used to obtain the literature reviewed: *comparison of teaching strategies, simulation, nursing education, quantitative research, layered simulation, posttest-only control group design, teaching strategies,* and *Kolb's theory*. Influential literature regarding the theoretical foundations that could not be disregarded dates back to the 1980s; however, current, peer-reviewed literature published between 2015 and the present provided pivotal information needed to form a foundation for this research study. A dearth of current literature on layered simulation required the review of articles from 2008 and earlier.

Theoretical Foundation

Kolb's experiential learning theory served as the theoretical framework for this study. Patient acuity in acute care settings requires nursing care that is consistent with growing demands and complexities. In nursing education, the use of simulation as a teaching strategy that can be used in a harmless environment is increasing (Aebersold, 2018; Benner et al., 2010). Kolb's experiential learning theory, first noted in 1984, focuses on learning conditions (McEwen & Wills, 2014). Kolb's (1984) theory, founded in the works of Dewey, Lewin, and Piaget, provides a model for experiential learning experiences. In it, Kolb postulated that adult development occurs in three stages: acquisition, specialization, and integration. The theory contains a description of how the conscious experience transforms through these stages by applications of higher levels of learning (Kolb, 1984). Kolb denoted that learning is a "processes whereby knowledge is

created through the transformation of experience" (p. 41). Experiential learning theory provides a holistic approach to learning by combining experience, perception, cognition, and behavior (Kolb, 1984). Kolb's theory suggests that this four-stage learning cycle can be utilized to enhance the attainment of certain knowledge and skills.

The first stage in the cycle involves creating a concrete experience for the learner, such as in the case of this study, the multilayered simulation experience (see Kolb as cited in McLeod, 2017). According to Kolb (1984), in the second stage, reflective observation, learners must be able to consider and scrutinize gained experiences from many perspectives. The third stage is abstract conceptualism whereby learners construct sensible theories that are founded in the analysis and integration of formed concepts established from observations (Kolb, 1984). The fourth and final stage is active experimentation; during active experimentation, leaners use created theories to make sound decisions and work through problems (Kolb, 1984). These stages provided the foundational basis for the current study.

Several studies have been undertaken that applied Kolb's experiential learning theory as an underpinning for research purposes. Williams (2019) performed a study to assess the efficacy of utilizing high-fidelity simulation as a teaching strategy in historically Black colleges and universities for baccalaureate nursing students. Williams employed Kolb's experiential learning theory as the theoretical foundation for this study. In a group consisting primarily of 19- to 23-year-old, African American, female students, the researcher used a Solomon four-group research design to compare traditional didactic lectures to high-fidelity simulation regarding the acquisition of knowledge in nursing

students. The results indicated that students who received the simulation pretest intervention performed better than students who did not during physical and respiratory assessments (Williams, 2019).

In an earlier study, Stanley et al., (2018) performed a study grounded on Kolb's experiential learning theory. In order to engage nursing students and promote active participation, the researchers created an online learning model utilizing video simulation and VoiceThread technology. They found that the incorporation of multimedia to simulation scenarios allowed students another pathway to practice and apply knowledge as well as stimulated student engagement (Stanley et al., 2018)

Fewster-Thuente and Batteson (2018) performed a mixed methods study for the purpose of determining if Kolb's experiential learning theory could be considered a reliable theoretical framework for health care provider education. With a sample size of 515 participants from eight different professional health care programs, participants were administered a 90-minute scenario on the process of patient rounding. Their qualitative findings reflected thematic alignment with Kolb's four stages of experiential learning; hence, the researchers concluded that Kolb's theory is a reliable framework that can be utilized to underpin health care provider education (Fewster-Thuente & Batteson, 2018).

In the current study, I hypothesized that through a multilayered simulation experience and the participants' subsequent reflective observation and conceptualism, first-year ASN students would be able to more accurately obtain blood pressure measurements. This hypothesis was deduced from Kolb's theory and led to the development of this research study.

Literature Review Related to Key Constructs

The primary research question guiding this study was: What are the effects of multilayered simulation on the skill acquisition of obtaining accurate blood pressure measurements for first-year ASN students in a fundamentals of nursing course when compared to the traditional teaching method of demonstration/return demonstration? With a focus on teaching blood pressure determination in undergraduate nursing, I present the literature reviewed for this study under three broad headings: research on teaching psychomotor skills in nursing, teaching strategies using simulation, and teaching strategies using multilayered simulation. With research on simulation expanding over the past 20 years, I reviewed literature pertaining to these constructs that was published between 2015 to 2020. Using a methodological approach, research addressing each construct is presented under the headings of quantitative, qualitative, and mixed methods studies.

Strategies for Teaching Psychomotor Skills

Historically, teaching and learning in nursing is addressed under cognitive, psychomotor, and affective domains (Billings & Halstead, 2009). By definition, the cognitive domain of learning focuses on knowledge development (Billings & Halstead, 2009). The affective domain of learning encompasses development of attitudes, beliefs, values, feelings, and emotions (Billings & Halstead, 2009). In contrast, the focus of the psychomotor domain is development of manual or physical competencies (Billings & Halstead, 2009). More specifically, the psychomotor domain relates to competency development of clinical practice skills, such as blood pressure measurement.

Literature related to strategies for teaching psychomotor skills in nursing is scarce. Most research I found focused on exploring the effects of newer technology-based, student-oriented strategies, like interactive multimedia, when teaching psychomotor skills (Cantey, 2017; Eyikara & Baykara, 2018; Kinder & Kurz, 2018). There is even less available research on teaching the psychomotor skill of blood pressure determination. Traditional methods, like demonstration/return demonstration, have been commonly utilized to assist students in acquiring and improving psychomotor skills (Billings & Halstead, 2009; McEnroe-Petitte & Farris, 2020). This strategy is faculty mediated with faculty controlling the practice environment in contrast to technology-mediated learning strategies, like multilayered simulation, where the student can maintain a more self-directed approach in learning while receiving consistent content (Billings & Halstead, 2009). In an earlier study, Jeffries (2001) compared the effects of traditional lecture with a videotape method and an interactive, multimedia CD-ROM strategy to teach oral medication administration. A convenience sample of 42 baccalaureate degree nursing (BSN) students in a fundamentals course participated in the study. The findings indicated that students in the group that utilized technology performed just as well as those students that received the traditional lecture with videotape but with much less preparation time needed for the return demonstration (Jeffries, 2001). Jeffries concluded that technology-based teaching methods needed to be incorporated and continuously updated to meet societal changes, address diverse learning needs, and advance the profession of nursing.

Teaching Strategies Using Simulation

In the profession of nursing, clinical judgment is crucial with regard to safety, quality, and confidence in decision making that affect patient outcomes. Nurse educators have been commissioned with the responsibility of ensuring that students are given the tools needed to perform successfully in current health care situations. Simulation has been validated to improve the development and acquisition of knowledge, skills, and attitudes needed to safely decide care for patients with complex health challenges (Fonseca et al., 2016). Historically, simulation has always been used in nursing education as a tool that introduces, teaches, and allows students to practice varying concepts and skills related to basic nursing care (Aebersold, 2018). The evolution of simulation from being supplemental to an integral part of nursing education has been well documented (Bryant et al., 2020; Cant & Cooper, 2019; Padilha et al., 2018; Sittner et al., 2015). Simulation is now an integral component of nursing curricula that promotes the development of skill acquisition and clinical judgment in a safe setting (Aebersold, 2018). Many nursing schools are using simulation in place of actual clinical hours as sites that host clinical students become sparse and increasingly difficult to attain (American Association of Colleges of Nursing, 2017).

Quantitative Studies

Simulation can be used in a variety of ways, including role play, standardized patients, computer and virtual simulation, and computerized mannequins with varying fidelity (Aebersold, 2018; Fonseca et. Al, 2016; Padilha et al., 2018; Pisciottani et al., 2017; Smith & Hamilton, 2015). There are many published quantitative studies that

reported findings that simulation is appropriate and effective as a teaching and learning strategy. For example, findings from several studies have shown a positive perception of the actual simulation experience (Kelly et al., 2016; Park et. al, 2017) and conveyed an increase in confidence, satisfaction, clinical judgment, and skills (Sarman & Pardi, 2019).

Janicas and Narchi (2016) conducted a quantitative study to explore the perceptions of 26, third-year, undergraduate nursing students regarding the use of simulation as a teaching strategy. Their findings indicated that students perceived simulation positively and that the teaching strategy promoted patient safety and student satisfaction in the teaching-learning continuum. The researchers concluded that the increase in self-confidence and satisfaction reported by the students validated the use of simulation as an appropriated teaching strategy.

In a quantitative study, Smith and Hamilton (2015) found that virtual reality simulation can be utilized as a tool for teaching clinical skills to nursing students. Their results indicated that participants who received instruction on an indwelling catheter insertion procedure using a virtual reality simulator experienced positive trends in skill acquisition.

Park et al. (2017) performed a one-group, pre- and post-test intervention study utilizing simulation to create a nursing practicum for graduating nursing students. They focused on outcomes such as self-efficacy, clinical judgment, acquisition of skills, and motivation to learn. Sixty-nine senior nursing students participated and completed the questionnaires. Their findings revealed significant improvements in the participants' clinical judgment, general self-efficacy, and motivation for learning. They concluded that

incorporating simulation teaching strategies into clinical education may significantly improve competencies of nursing students.

Qualitative Studies

Several themes have emerged from the vast amount of qualitative studies that have been undertaken that examines simulation as an effective teaching strategy. A major theme that emerged from qualitative research is the ability of participants to manage complex real-life situations in a safe environment and transfer the knowledge gained to a real-life clinical experience (Amod & Brysiewicz, 2019; Kapucu, 2017; Wyllie & Batley, 2019). Participants reported the simulation experience as a useful tool that increased confidence and encouraged deeper learning (Costello et al., 2018; Morrell-Scott, 2018). Participants also exhibited an increase in knowledge and decision-making capabilities (Bliss & Aitken, 2018; Bussard, 2015, Crafford et al., 2019). Nurse educators have also reported positive perceptions of the simulation experience as an effective teaching strategy. Nursing educators found that simulation increased motivation, skills, and social interaction needed to promote effective communication (Lillekroken, 2020; Mackinnon et al., 2015).

Mixed Method Studies

Mixed method studies often revealed that participants exhibited positive learning effects from the incorporation of simulation into the learning experience. Enhanced knowledge, an increase in self-confidence and clinical reasoning skills were revealed during analyses of collected data (Koplow et al., 2019; Kunst et al., 2017; Soccio, 2017; Verkuyl & Hughes, 2019). Mixed method research has also revealed that the use of

simulation enhances the participant's ability to effectively participate and communicate as an interprofessional team member in an acute care environment (Choi et al., 2020; Cunningham, et al., 2018; Liaw et al., 2018).

Layered Simulation

Layered simulation involves the concurrent use of multiple fidelities of simulation (Schlicher & Eyck, 2008). There was a dearth of literature found that examined the use of layered simulation in health care. I found no literature during a search of the past five years regarding layered simulation. It was essential to expand the literature search dates to a time period before 2015. I found two studies, both conducted by the same researchers, on layered simulation. Schlicher and Eyck (2008) evaluated the effectiveness of layered simulation on medical malpractice for medical students. Participants for both studies included senior resident physicians in an emergency medicine program. Seven medical residents volunteered to be part of a recorded simulated clinical encounter in which a patient would intentionally be given the wrong medication that ultimately led to the patient's demise. The students were provided with a survey regarding the simulated experience and asked to complete it anonymously. Six weeks later, one of the students was picked, based on certain criteria, to participate in a recorded simulated deposition related to the previous clinical simulation scenario.

Following the deposition, audience members who watched both of the simulated experiences completed a survey anonymously. The 17-question survey consisted of 12 questions that utilized a 5-point Likert scale ranging from 5-*strongly agree* to 3-*neutral* to 1-*strongly disagree*. These questions evaluated the effectiveness of layered simulation as

a teaching strategy. The final five questions examined the respondents' perception of medical malpractice based on the simulated scenarios. The data were analyzed by a statistical consulting service. Results of the survey noted positive responses regarding the layered simulation approach. The respondents noted that their knowledge of medical malpractice increased as a result of the layered simulation experience (Schlicher & Eyck, 2008). The authors concluded that novel simulation avenues, including, layered simulation should be studied.

Computer-Assisted Simulation

The use of computer-assisted simulation, a form of low-fidelity simulation, as a teaching strategy has grown exponentially in the past decade (Greenberger & Dispensa, 2015). There is vast evidence that substantiates its use in nursing education (de Lima Lopes et al., 2019; Ferguson & Estis, 2018; Herron et al., 2019; Sarasnick et al., 2017). It is currently being utilized in other healthcare educational programs, but a lack of research regarding its use in undergraduate nursing education when used in conjunction with another form of simulation, provides a rationale for further research (Stone et al., 2020).

Methodology

Curran et al. (2015) conducted a randomized controlled quantitative study that investigated the effects of utilizing simulation for neonatal advanced life support education for healthcare students. The purpose of this study was to compare the effects of low versus high-fidelity manikin simulators in neonatal resuscitation instruction. The authors utilized a randomized posttest-only control group study designed to conduct the study. Third year undergraduate medical students were divided into two groups: an

experimental group utilizing a high-fidelity manikin simulator and a control group utilizing a commonly used low-fidelity manikin simulator. While participants performed in an amalgamated skills station, the concepts of satisfaction, confidence and teamwork behavior were compared between the two groups. Findings from the study showed that participants in the experimental group reported significantly higher scores in satisfaction and confidence (Curran et al., 2015). Findings also revealed no significant differences with the concepts of teamwork behavior and skills performance.

Kim et al. (2019) also performed a study that examined the effects of simulation-based advanced life support education of health-care students. The purpose of the study was to compare the concepts of performance, self-efficacy, teamwork, and acquisition of knowledge. Also utilizing a posttest-only design, 60 fourth-year nursing students were randomly assigned to complete either 4.5-hour experimental simulation-based education or 4.5 hours of lecture-based education. Analyzation of the data collected was completed by utilizing descriptive techniques and the Mann-Whitney U test. A comparison of results from the two groups showed that the experimental group produced significantly higher results in knowledge acquisition, performance, and self-efficacy with no significance noted with teamwork (Kim et al., 2019). The authors concluded that simulation-based advanced life support education should be integrated into nursing education curricula to enhance nursing students' competence (Kim et al., 2019).

Salari et al. (2018) conducted a quantitative study that examined the effects of pure problem-based learning, hybrid problem-based learning, and lecturing. The purpose of the study was to examine and compare the effects of problem-based learning in

acquiring cognitive skills in pediatric nursing education. The authors used a quasi-experimental posttest only research design to conduct the 8-week study. Students enrolled in a pediatric nursing course were divided into three groups, two experimental and one control. Both experimental groups included the intervention of problem-based learning, pure-based and hybrid. The control group was subjected to lecturing or conventional teaching and learning. The cognitive concepts of test performance, mental, effort, and instructional efficiency were compared among the groups. Findings from the study revealed that the pure and hybrid problem-based learning methods, when compared to conventional techniques significantly improved students' test performance and instructional efficacy with less mental effort (Salari et al., 2018). Conclusions inferred from the study were that both pure and hybrid problem-based learning strategies are effective in pediatric nursing and can also be helpful when faculty shortages are noted.

Lanz and Wood (2018) conducted a study that examined the use of different teaching strategies for communicating patient status reporting in senior baccalaureate nursing students. The purpose of their research study was to compare the effects of using an interactive student-centered teaching strategy to the use of a high-fidelity simulation strategy that included role modeling from experts and coaching. There were 141 senior level nursing students enrolled in an adult health course that participated in the study. Using independent samples *t* test analysis, results yielded no significant differences between the experimental and control groups (Lanz & Wood, 2018).

Wright et al. (2018), also using a three-group, posttest-only design, conducted a research study that evaluated the use of virtual simulation in nursing education. The

purpose of the study was to investigate the effectiveness of virtual simulation on participant satisfaction for 61 students enrolled in an adult health nursing course. Findings from this study showed no significant post simulation and examination scores (Wright et al., 2018). Participants did, however, report that virtual simulation was a positive experiential undertaking that assisted them in acquiring concepts related to adult health nursing. The authors concluded that results also inferred that other research studies related to examining the effectiveness of different simulation methods need to be conducted to understand if the acquisition of knowledge and skills can be improved (Wright et al., 2018).

Claman (2015) conducted a pilot study that examined the effects that multiuser virtual environments had on student engagement. The purpose of the study was to compare the effects of web-based synchronous instruction with incorporated Multi-user Virtual World Environments to traditional asynchronous learning methods. Claman utilized a quasi-experimental two group posttest-only design to conduct this study. Twenty-one family nurse practitioner students were divided into one of two groups that utilized either the experimental synchronous method or the traditional asynchronous method. The researcher utilized the Community of Inquiry survey to examine student engagement. The 34-question Community of Inquiry survey is a self-reported survey that measures engagement in teaching, social, and cognitive presence on a Likert scale. Results indicated that engagement scores were significantly higher for the synchronous learning environment when compared to the asynchronous learning environment (Claman, 2015). The author concluded that synchronous online learning that incorporated

multi-user virtual environments could potentially increase student engagement and, subsequently, improve success in the online learning environment. Claman also inferred that nurse faculty must learn how and plan to deliver nursing education content utilizing interactive methods (Claman, 2015).

Instrumentation

The instrument, the Blood Pressure Skills Check-Off Tool, that I used for this study was developed by faculty at the organizational host site. The initial 28-item tool has an established content validity in that the steps follow the recommendations of significant nursing of fundamentals textbooks (Berman & Snyder, 2016; Potter et al., 2017; Smith et al., 2017). The initial instrument has been used constantly in the fundamentals course for this nursing program and has been established as an accurate assessment of skill acquisition. Several quantitative studies have been conducted that utilize faculty-made instruments as the primary tool for data collection (Sarmasoglu et al, 2016; Todd et al., 2008).

Sarmasoglu et al. (2016) conducted a quasi-experimental study that explored the acquisition of psychomotor skill development in nursing education when using standardized patients. The purpose of the research was to examine the effects of using standardized patients on the acquisition of skills related to blood pressure measurements and subcutaneous injection administration with freshman nursing students.

Instruments used for data collection in this study were created by the researchers. Sarmasoglu et al. referenced Nursing Fundamentals textbooks and corresponding literature. Blood pressure measurement and subcutaneous injection administration

checklists were developed and reviewed by nursing faculty that taught in a fundamentals of nursing course. The researchers revised the checklist after receiving feedback from nursing faculty. The blood pressure measurement checklist contained 30 steps and the subcutaneous injection administration performance checklist contained 25 steps. The steps were measured by "completely performed, partially performed, or could not be performed" (p. E2).

The study was divided into three different phases (Sarmasoglu et al, 2016). The first phase included a lecture concerning blood pressure measurements and subcutaneous injection administration. The second phase involved students being divided into two control and two experimental groups practicing skills. Students in the experimental group practiced measuring blood pressure or subcutaneous injection with standardized patients. Students in the control group practiced with partial task trainers. The third and final phase involved the students measuring the arterial blood pressure of a real patient and administering subcutaneous injections. Nursing faculty verified the accuracy of the students' blood pressure measurement and subcutaneous injection administration. Eighty-seven nursing students enrolled in a fundamentals nursing course were randomly assigned to the different groups.

Analysis was used by applying the Mann-Whitney U statistical test to scores attained by the control and experimental groups for blood pressure measurement (Sarmasoglu et al., 2016). A *t* test was used to analyze scores obtained by the control and experimental groups for subcutaneous injection administration. Results showed significantly higher performance results of the students in the experimental group when

compared to the control group for blood pressure measurements. Results showed no significant differences in the performance results for subcutaneous injection administration. The research concluded that standardized patients can be incorporated into nursing education curricula when acquiring psychomotor skills of students (Sarmasoglu et al., 2016).

Soares de Freitas et al. (2016) performed a cross-sectional study that examined the failures related to the measurement of blood pressure among nursing students. The purpose of the study was to ascertain errors related to the process of obtaining blood pressure measurements taken by nursing students in an undergraduate nursing program. A simple random sampling method was used identify the 76 students from a pool of 186 students enrolled in the nursing undergraduate course.

The instrument, a 28-step checklist, utilized in this study was validated by nurse members of a group, Nursing Procedures Incubator Research Team, who also assisted in data collection (Soares de Freitas et al. 2016). The checklist was organized into three different blocks. The first block involved observations that are undertaken before measuring the blood pressure. The observations included analyzing the patient's medical record, hand hygiene, gathering supplies, cleaning stethoscope, identifying the patient, explaining the procedure, and determining conditions that may affect blood pressure measurement obtainment (Soares de Freitas et al., 2016). The second block of the checklist contained the technical steps needed to obtain accurate blood pressure measurements. The third block listed final observations involved after obtaining the blood pressure measurement. These observations included analyzing the value, hand

hygiene, and documentation. Results indicated significant failures in the initial selection of the necessary supplies, the incorrect measurement of arm circumference, and not washing hands after the procedure (Soares de Freitas et al. 2016).

Summary

In summary, the purpose of this study was to examine the effects of layered simulation in nursing education. Kolb's experiential learning theory provided the theoretical foundation for this study. Using Kolb's theory, previous studies showed success in providing evidence that simulation can be used as an experiential learning event. As simulation becomes relevant as an appropriate teaching and learning strategy, research is becoming more available that provides validation of different approaches on how stimulation can be utilized. Layered simulation has been utilized by other health care providers to enhance education, but no research has been noted in nursing education. However, a search of the literature provided very little information regarding layered simulation in nursing education. I conducted this study to help fill the major gap in literature related to layered simulation in nursing education. Findings from my study will add to the knowledge base for the profession of nursing and nursing education.

I compared the effects of multilayered simulation and the traditional demonstration/return demonstration strategy on the skill acquisition of obtaining blood pressure measurements. Several studies have also utilized the posttest-only design when comparing the effects of simulation with other teaching and learning strategies. Although there are vast amounts of evidentiary support validating that the posttest-only research design was appropriate for this type of study, no studies, to date, have been found that

tested the effects of layered simulation in nursing education using a posttest-only design. This study addressed that gap in literature. I will discuss, in more detail, the methodology and research design utilized in my study in Chapter 3.

Chapter 3: Research Method

For over a decade, simulation has been used in a variety of settings as an effective teaching and learning strategy (Society for Simulation in Healthcare, 2018). And while there has been a noticeable increase regarding the use of simulation in a variety of approaches and settings, there is little research on the use of multilayered simulation as a viable and effective teaching/learning strategy. Therefore, the purpose of this research study was to examine and compare the effects of multilayered simulation with the effects of the traditional teaching method of demonstration/return demonstration. The effects were compared in first-year ASN students attempting to acquire the skill competency of obtaining accurate blood pressure measurements.

In this chapter, I provide details regarding the research design chosen to examine the effects of utilizing multilayered simulation in an ASN fundamentals course. The rationale for selecting the research design is also discussed. Identification and definitions of study variables are provided. I also identify the target population and chosen sample, including participant inclusion and exclusion criteria. Specific sampling strategies are discussed, including the procedures for sampling, recruitment, and data collection and analysis. A summary detailing the power analysis used to determine sample size is also discussed as well as issues that threatened the validity of this research study and procedures used to combat those threats. Finally, this chapter also includes the procedures used to address possible ethical concerns, including permission needed to utilize established instruments and procedures for addressing human subject approval. I provide

details regarding the delineation of roles of all individuals that participated in this research study.

Research Design and Rationale

I used a quantitative approach; grounded in a postpositivist paradigm; with an experimental, posttest-only, comparison design for this research study. Postpositivism is a commonly accepted contemporary research paradigm in nursing (McEwen & Wills, 2014). Postpositivism challenges the traditional positivist view that truth is absolute (Creswell, 2009). Postpositivists recognize that although exploration can be subjective, rigorous, and objective, manipulation of variables through experimentation and other quantitative research methods is supported (Creswell, 2009; McEwen & Wills, 2014; Ryan, 2018). In postpositivism, it is posited that researchers are affected by their unique experiences and perceptions (Trochim, 2006). Therefore, personal values were crucially important in determining the choice of research design and the approach for carrying out this study.

Quantitative research, the most commonly used approach for scientific exploration in nursing, allowed for the incorporation of logistical and deductive explanations needed to examine the variables included this study (see Fan-Ko et al., 2018; Grove et al., 2013; McCusker & Gunaydin, 2015). Science is affected by causality, and a rigorous scientific approach that examines causality is crucial in increasing the knowledge base in the discipline of nursing (McEwen & Wills, 2014; Thompson et al., 2018). Experimental designs, including the posttest-only design, allows for the highest possible amount of control needed to explore cause and effect relationships and is

consistent with research designs needed to advance knowledge in the discipline of nursing (see Grove et al., 2013). The independent variable for this study was exposure versus nonexposure to multilayered simulation for blood pressure measurement competency. The dependent variable was blood pressure competency measured as mean scores. I developed the research question to examine the effects of multilayered simulation on the skill acquisition of obtaining blood pressure measurements for first-year ASN students in a fundamentals of nursing course and compare the effects to the traditional teaching method of demonstration/return demonstration. A posttest-only design was the most appropriate choice for this study in that it was not possible to evaluate the dependent variable before treatment is applied (see Frankfort-Nachmias & Nachmias, 2008). A major disadvantage of the posttest-only design is that there is no baseline measurement (Grove et al., 2013). However, for the purposes of this research study, it was not necessary or appropriate to have baseline information. I assumed that the two groups are demographically similar, and the only difference was the introduction of the independent variable to the experimental group (see Grove et al., 2013).

Methodology

Population

The target population for this research study were first-year nursing students enrolled in an ASN program in Louisiana. According to the 2017 Annual Report from the Louisiana State Board of Nursing (LSBN), there were 1,278 qualified first-year nursing students enrolled in an ASN program in the state of Louisiana (LSBN, n.d.). The research study site usually admits between 20 to 40 students every fall and spring semester.

Sampling and Sampling Procedures

I used a nonprobability sample strategy for this study. Nonprobability samples are samples that are based on the researcher's subjective judgment and may not contain every component of the target population as opposed to a sample based on random selection (Frankfort-Nachmias & Nachmias, 2008; Grove et al., 2013). Nonprobability samples, especially convenience samples, are commonly used in social science research when random sampling is not an option (Grove et al., 2013). Although probability sampling offers a more precise calculation of the population's parameters, for the purpose of this exploratory research study, a convenience sample was the most appropriate choice (see Frankfort-Nachmias & Nachmias, 2008). Convenience sampling includes participants who are available at the time of the study (Grove et al., 2013). For this study, use of a convenience sample outweighed the benefits that a probability sample could have provided.

I took the sample from students enrolled in a local ASN nursing program located in northwest Louisiana. The inclusion criterion for participants included being enrolled as a first-year nursing student in a fundamentals of nursing course in an ASN program. Students who had previous knowledge on how to obtain blood pressure measurements as taught in an ASN program were excluded from this study.

In quantitative research, it is important to identify an appropriate sample size for statistical analysis considering levels of significance, power, and population effect size (Albert & Connor, 2012; Grove et al., 2013; McConnell et al., 2019). After consulting with a quantitative research advisor at Walden University, I decided that the most

appropriate statistical test for this research study was a two-tailed, independent samples *t* test. After inputting the significance level, power, and population effect size into G*Power, a power analysis tool, it was determined that 52 participants, 26 per group, were needed to appropriately examine the hypotheses and establish a confidence level of 95% for this research study. The calculation obtained from G*Power is provided in Appendix A.

Because only a sample and not the entire population is tested, a hypothesis can never be proven but instead rejected or retained (Frankfort-Nachmias & Nachmias, 2008). The level of significance represents the probability of committing a Type I error or rejecting a hypothesis that is actually true. Common significance levels, represented by alpha (α), utilized in research are 0.001, 0.01, and 0.05 (Frankfort-Nachmias & Nachmias, 2008). A more rigorous significance level, $\alpha = 0.00$, requires a larger sample size when compared to a $\alpha = 0.05$. An alpha level of 0.05 is also equivalent to a 95% probability of obtaining a correct statistical conclusion. Since the significance level is usually a fixed number and most nursing studies utilize a significance level of 0.05, I chose it as an appropriate level for this study (Albert & Connor, 2012; Grove et al., 2013).

Another important factor in determining the ability to appropriately reject the null hypothesis is the power level. A sufficient power level is needed to distinguish relationships (Grove et al., 2013). Larger sample sizes require greater power. A power level of 80% is often utilized in nursing research and is the minimally acceptable choice that is recommended (Grove et al., 2013; McConnell et al., 2019). I selected a power

level of 80% for this research study because a convenience sample was utilized, and the participant pool was limited. The focus of this research study was to compare differences in the effects of multilayered simulation and the demonstration/return demonstration method.

For the purposes of this study, I selected a large effect size of 0.8 to examine the differences between the two groups. Experimental designs with sampling that is homogenous with the population require smaller sample sizes, usually about 20 to 40 participants per group (Albert & Connor, 2012). This effect size was appropriate for the current study because smaller samples can identify larger effect sizes (see Grove et al., 2013). A review of the research studies that utilized similar methods substantiated the rationale for effect size used in this study (see Albert & Connor, 2012; Davila, 2019; Kim et al., 2020; Salari et al., 2018.)

Procedures for Recruitment, Participation, and Data Collection

I recruited participants from a fundamentals course in a local ASN program. A verbal announcement; research study flyer; and written correspondence that explained the purpose of the study, the importance, and exact participant involvement was the initial communication strategy for recruitment. All students who met the inclusion criteria and who were interested were invited to participate.

Informed Consent

I provided all eligible participants with informed consent through a formally written consent document, after receiving approval from the IRBs from both Walden University, approval number 0530407, and the study site. Included in the document was

an introduction section, explaining who I am and an invitation to participate in the study as well as sections describing the purpose of the research study, participant selection methods, data collection procedure, and the duration of the participant's time were included in the informed consent document. In the document, I further explained that participation was voluntary and that participants would suffer no negative consequences regardless of their participation in the study. The document also explained that participants were free to ask questions throughout the study and that they could withdraw from the study at any time. Procedures for maintaining confidentiality of data were included as well, along with how the results are disseminated.

Data Collection Procedures

I collected the data for this study from a variety of sources. A survey instrument was used to establish and collect demographic data that included the participant's age, ethnicity, gender, and educational level. Phase 1 of the data collection process included a lecture on the importance of obtaining accurate blood pressure measurements. Both groups, the control and intervention group, received this lecture. Phase 2 involved teaching how to obtain blood pressure measurements and involved the manipulation of the independent variable in multilayered simulation. The control group was exposed to the traditional faculty-led demonstration on how to obtain a blood pressure measurement. The intervention group was exposed to the first layer of simulation, a low-fidelity, computer-based simulation on how to obtain blood pressure measurements. With permission from Assessment Technologies Institute, LLC (ATI), the intervention group viewed a skills simulation module on how to obtain blood pressure measurements. Phase

3, the practice stage, allowed participants to practice the learned behaviors using a high-fidelity simulation mannequin. Both groups practiced using a high-fidelity simulation mannequin capable of blood pressure monitoring. Participants were provided with the opportunity to practice obtaining blood pressure measurements outside of laboratory time. The final phase involved a return demonstration. Blood pressure readings were measured simultaneously with nursing faculty, utilizing a double-headed stethoscope. Faculty did not provide verbal or physical cues during the procedure. Table 1 serves as a visual detailing steps in data collection.

Table 1

Visual Depiction of Procedure

Group	Day 1	Day 2	Day 3	Day 4	Day 5
Experimental	Lecture	Computer-simulated demonstration (Low fidelity)	Practice with high-fidelity mannequin	Practice with high-fidelity mannequin	Return demonstration on standardized patient
Control		Demonstration by a faculty member			

Instrumentation and Operationalization of Constructs

Instrumentation

The Blood Pressure Skills Check-Off tool (see Appendix C) utilized in this study was a modified version of the tool originally developed by the host academic nursing program faculty. The School of Nursing was granted permission through email to utilize and modify the original tool for this study. The dependent variable, blood pressure competency measurement, was assessed using this tool.

The type of validity of an instrument examines how well the tool can measure the variable that is being explored (Grove et al., 2013). The original 28-item tool has an established content validity in that several notable fundamentals skills textbooks recommend the same steps with similar wording as listed in the tool for assessment of blood pressure measurements (Berman & Snyder, 2016; Potter et al., 2017; Smith et al., 2017; Williams, 2018; Yoost & Crawford, 2016). The reliability of an instrument denotes how consistent the instrument is at measuring a phenomenon in research (Frankfort-Nachmias & Nachmias, 2008; Grove et al., 2013). The original tool has been utilized repeatedly in the fundamentals course at study site and has been proven to be an accurate assessment of skill acquisition. The tool has also been validated by three fundamentals of nursing faculty at other undergraduate schools of nursing programs in the area. I generated measurement of the internal consistency of this tool for this study utilizing IBM's Statistical Package for Social Sciences (SPSS), Version 27. The original 28-item tool was constructed on an ordinal level, with items being scored as "met" or "not met." The modified tool added an item that denoted the interpretations of the participant and nursing faculty of the blood pressure measurement. Each item was scored as 1 = met or 0 = not met, making all items at the ratio level.

Independent Variable Manipulation

The independent variable, exposure versus nonexposure to multilayered simulation, involved the use of two layers of simulation, low-fidelity and high-fidelity simulation. Examples of low-fidelity simulation include computer-based simulation, task trainers, and virtual patient simulation that provide little or no physical interactivity (Li,

2007). High-fidelity simulation includes the use of human patient simulators or standardized patients that provide an interactive experience without the risk of actual patient harm (Aebersold, 2018). Low-fidelity simulation was provided through use of a computer-based simulation skills module series provided by ATI. The skills module series provides interactive, self-paced procedures needed to acquire basic psychomotor skills, such has obtaining vital signs or providing safe medication administration (ATI, 2015). Permission to use the vital signs module, specifically the blood pressure skills module, in this research study was granted by ATI (Appendix D). ATI, founded in 1998, offers support for nursing education programs by creating remediation and standardized testing software (ATI, 2019). Since its inception, ATI has assisted schools of nursing in achieving program-level outcomes, such as increased passed rates for the *National Council Licensure Examination*. ATI boasts a nearly 100% *National Council Licensure Examination* pass rate (ATI, 2019). The target audience for the vital signs skills module includes registered nursing students (ATI, 2015).

Data Analysis Plan

I collected data collected for this study from two sources: participant demographic information and blood pressure reading scores. Both demographic data and blood pressure reading measurements were entered into SPSS for data analysis. Descriptive statistics were used to assess and report demographic data. Inferential statistics using a two-tailed independent samples *t* test were used to assess group differences between the experimental and control groups. The Bland Altman method was utilized to examine the level of agreement between the systolic and diastolic measurements for two instructional

methods. The Bland Altman method is an uncomplicated technique that examines the differences between two quantitative measurements (Giavarina, 2015). This method utilizes an XY scatter plot to denote the data taken from two different values of the same measurement. The X-axis plots the mean of two values (the control and experimental groups), while the Y-axis plots the difference between the two values (Fèvre, 2008). The Bland Altman method assisted in measuring the agreement of the blood pressure measurements of the participants of both groups. SPSS was also utilized to assess for the accuracy of the entered data, missing data, and any issues regarding normality.

RQ: What are the effects of multilayered simulation on the skill acquisition of obtaining accurate blood pressure measurements for first-year associate degree nursing (ASN) students in a fundamentals of nursing course when compared to the traditional teaching method of demonstration/return demonstration?

H_0: There is no significant difference of the effects of layered simulation on the skill acquisition of obtaining accurate blood pressure measurements when compared to the traditional teaching method of demonstrate/return demonstration.

H_1: Fundamentals of nursing students who receive simulation training will be more competent in blood pressure competency than students who receive training using demonstration/return demonstration.

Statistical Analysis

After consulting with a quantitative research advisor at Walden University, it was decided that an independent *t* test would provide the best analysis, based on the instrument used for data collection and for the purpose of this study. An independent *t*

test analysis was performed to examine any statistically significant differences between the two group means on both the independent variable of multilayered simulation and the dependent variable of skill acquisition of obtaining accurate blood pressure measurements. Table 2 provides a visual analysis of the data analysis plan based on the following research question: Is there a difference in blood pressure competency between fundamentals of nursing students who receive simulation training versus those who receive demonstration/return demonstration?

Table 2

Data Analysis Plan

Data to Be Analyzed & Reported	Variable	Level of Measurement	Statistical Test
Demographic data	Age Gender Ethnicity educational level	Nominal / ordinal	Mean, SD
Multilayered Simulation vs Demonstration/Return Demonstration	Independent	Ratio	Independent Samples *t* test
Blood pressure competency scores	Dependent	Ratio	Independent samples *t* test; Bland Altman plot method

Threats to Validity

The ability to identify potential threats that may affect the validity of study findings is an important factor when collecting sound evidence that may advance the profession of nursing (Grove et al., 2013). Concepts that are crucial to recognizing the

validity in research are causality, comparison, manipulation, control, and generalizability (Frankfort-Nachmias & Nachmias, 2008; Grove et al., 2013).

Causality

A crucial postpositivist philosophy is that causality more than likely determines effects or certain outcomes of phenomena. The purpose of this research study was to examine the effects of multilayered simulation on the skill acquisition of obtaining blood pressure measurements. The demonstration of causality involves three distinct processes that include demonstrating covariation, nonspuriousness, and time order. The hypothesis associated with this research study was that multilayered simulation would significantly improve the accuracy of obtaining blood pressure measurements. I hoped to provide evidence that any relationship that exists between the independent and dependent variables were not a result of any other extraneous variable. Findings from this research study provided evidence that the cause, multilayered simulation, would occur first and lead to the effect, acquiring the skill of obtaining blood pressure measurements. Statistical analysis programs were utilized to control for some of the threats of concern. SPSS was utilized to analyze data collected during this research study.

Comparison, manipulation, and control are all components that are necessary when establishing causality. Comparison is needed to establish covariation or variable correlation. To demonstrate correlation in this study, the experimental group was compared with the control group. Manipulation assists in demonstrating the time order of events. In quantitative experimental research, the researcher must have some control over manipulation of the variables in order to be able to measure the effect of the intervention

(Frankfort-Nachmias & Nachmias, 2013). During this research study, the experimental group received the multilayered simulation intervention, while the control group received the traditional demonstration/return demonstration method.

Internal Validity

Control is crucial in experimental designs. It determines whether internal validity has been achieved for the research study. The researcher must be able to eliminate extrinsic and intrinsic factors that may contribute to other reasons why the hypothesized effect may occur. The extrinsic factor of note related to this research study was the use of convenience sampling. Convenience sampling is a sampling technique that utilizes participants that happen to be available at the time of the study under the right conditions (Grove et al., 2013). Randomization of the selected sample into either the control or experimental group will help eliminate threats related to using a convenience sample (Frankfort-Nachmias & Nachmias, 2013). Intrinsic threats are related to the research study itself and will be controlled by using a control group that will not receive the intervention (Frankfort-Nachmias & Nachmias, 2013).

External Validity

External validity involves the extent to which the results for this research study can be generalized to the intended population (Grove et al., 2013). Data related to the demographical characteristics of each participant, and if possible, including those who refuse to participate, were collected via the demographic survey, Appendix A, to examine the homogeneity of the sample (Grove et al., 2013). Even though I chose convenience sampling for this research study, according to the Louisiana State Board of Nursing

Annual Report (LSBN, n.d.), the characteristics are representative of the intended population. Societal events and concerns can also affect the external validity of a research study (Grove et al., 2013). I conducted this study during a global pandemic. All Centers of Disease Control guidelines were maintained, along with the guidelines established by the university when the data was collected.

Ethical Procedures

Ethical research is pivotal to creating sound evidence for any profession or discipline, including nursing (Grove et al., 2013). Potential ethical issues should be considered and addressed when conducting any type of research. Several ethical concerns for this research study were anticipated and addressed. One major ethical issue of note is that this research study was conducted at my place of employment. I recognized that potential biases could have been perceived as a result of performing "backyard research." Backyard research is research that is performed where the researcher may have a personal stake either with the site or with the participants involved (Creswell as cited by Hull, 2017). Improvement in academic programs, personal achievement, and improved student learning outcomes are just a few of the merits associated with site-based research (Hull, 2017). During the planning stages of this study, consequences that may have arisen as a result of performing backyard research were anticipated (Creswell, 2009).

Institutional Permissions

Issues regarding participatory and institutional consent, along with the issue of reciprocity were considered. Initial permission was obtained from the director of the School of Nursing at the site where the study was performed. Subsequent steps to gain

permission were initiated through the Division of Research, Sponsored Programs, and Institutional Effectiveness (RSPIE) which is the department that grants institutional permission regarding research and data collection at the study site. No concerns were anticipated with regard to gaining written permission as verbal permission had already been granted. Walden's IRB process involves four steps that begins once the university research reviewer begins to analyze the proposal. A concern of note was the collection of data from students where I am employed. In accordance with Walden's IRB standards, data collected for this research study had to be a result of the "byproduct of normal educational practices" and no participant personal information was included in this research study (Walden University, 2020). It is important to note that no data collected was from my own students. No other ethical concerns were of note that could possibly hinder approval from the university's IRB.

Informed Consent

An informed consent letter that includes explicit explanation of the purpose of the research study, the participant's role, as well as the goal of the study was given to every potential participant. Participants of any research study have the right to remain anonymous and have any information collected remain confidential (Grove et al., 2013). The informed consent also included acknowledgement of procedures of anonymity for the participants. Participants were informed that no coercion or force would be utilized when attempting to gain participation and that the findings of this research study would, in no way, influence the outcome of the students' matriculation through this school of nursing. A crucial note to include is that I was not involved in the participant's course

work at this stage of their matriculation. No harm or discomfort to participants was anticipated during the course of this research study and, as such, no compensation was offered for participation.

Data Collection Concerns

All data collected were anonymous and kept confidential by me. Data collection and storage is my sole responsibility. I am the only person who had access to the data collected. As aforementioned, permission to use the research study site was gained through the division of RSPIE. In experimental studies, data should be collected so that all participants benefit from the study (Creswell, 2009). As such, at the completion of this study, both the layered simulation and demonstration/return demonstration method was made available for all participants.

Data Analysis and Interpretation Concerns

Participants' anonymity remained intact, in that, no participant names were associated with this research study. After consulting with an IRB advisor at Walden University, I determined that all data collected in this research study, including informed consent paperwork, would be kept for a minimum of 5 years, congruent with Walden's IRB policies, and then discarded.

Designated Roles

Research in academia, specifically higher education, is a scholarly role of faculty (Billings & Halstead, 2009). While research is a primary role expected of all faculty, it was important to delineate, for the purpose of the study, all roles involved. Multiple individuals were associated with this research project. I had a dual role as both designer

and executioner of this research study. Others included in the project were committee members and nursing faculty of the fundamentals of nursing course. I, as the researcher, was responsible for all aspects of this research study. The lecture, faculty demonstration on how to obtain a blood pressure measurement, and assignment of the computer module simulation was my responsibility. After discussion with the course faculty, an understanding of agreement regarding course faculty roles for this research study was obtained. The primary role of the faculty of the fundamentals nursing course was to evaluate the return demonstration of the procedure for obtaining blood pressure measurements from the participants. It was through the evaluation process that faculty was also involved in data collection by completing the Blood Pressure Skills Check-Off tool, Appendix C, for each participant. All analysis and interpretation of data was performed by me. For the purpose of this research study and data collection, numbers were assigned to replace student names.

Summary

In conclusion, I utilized a quantitative posttest-only approach to examine the effects of multilayered simulation in first-year nursing students acquiring the skill of obtaining blood pressure measurements. Students were divided into two groups with the experimental group receiving the independent variable, multilayered simulation. The control group received the traditional demonstration/return demonstration method. The Blood Pressure Check-Off tool (Appendix C) was utilized to collect information and SPSS was used to analyze the data. Results obtained from this research study are provided in the Chapter 4.

Chapter 4: Results

The purpose of this research study was to assess the use of multilayered simulation as an effective teaching method in nursing education. Broadly speaking, multilayered simulation is defined as the simultaneous use of multiple fidelities of simulation (Schlicher & Eyck, 2008). The operational definition used for the purpose of this study is the concurrent use of a low-fidelity, computer-simulated program along with a high-fidelity mannequin to support the attainment of obtaining accurate blood pressure measurements. I measured the accuracy of the skill of obtaining blood pressure measurements by first-year ASN students. The overall aim of this study was to compare the effects of multilayered simulation to the effects of the more traditional method of demonstration/return demonstration. The null hypothesis was that there would be no significant difference between the effects of layered simulation on the skill acquisition of obtaining accurate blood pressure measurements when compared to the traditional teaching method of demonstration/return demonstration. I analyzed the results of this study using SPSS. This chapter includes discussions of the data collection process, the intervention used, and the results gained from the study.

Data Collection

Demographic Data

Descriptive statistics of the sample included frequency distribution by gender, age, ethnicity, and educational level. Twenty-three ASN students participated in the study. The sample consisted primarily of female students (n = 22, 95.7%), with only one male student, representing 4.3% of the group. Participant ages ranged from 20 to 54 years

old, with about 60% of the group being age 30 or below. The mean and standard deviation of participant ages are depicted in Table 3. The sample was predominantly Black (*n* = 20, 87%), with one participant choosing not to provide their ethnicity. Approximately 65% of participants indicated they had some college education (*n* = 15) with the rest of the sample indicating the possession of a professional certificate (*n* = 4, 17.4%) or a bachelor's degree (*n* = 4, 17.4%). Table 4 shows specific frequencies and percentages of the sample. Although a nonprobability sampling technique was used for this study, the sample was representative of the population of interest in that all participants were enrolled in an ASN program in Louisiana.

Table 3

Means and Standard Deviations of Demographics

	Gender	Age	Ethnicity	Educational Level
M	-	31.0870	-	2.6957
Mode	2	26	2	2
SD	0.20851	8.87752	1.50230	1.14554

Note. $N = 23$

Table 4

Demographic Frequencies

Demographic	*N*	%
Gender		
Female	22	95.7
Male	1	4.3
Total	23	100
Age		
20	2	8.7
22	1	4.3
24	2	8.7
25	2	8.7
26	3	13.0
28	1	4.3
29	1	4.3
30	2	8.7
32	1	4.3
34	1	4.3
35	2	8.7
39	2	8.7
45	1	4.3
47	1	4.3
54	1	4.3
Total	23	100
Ethnicity		
Black, non-Hispanic	20	87.0
White, non-Hispanic	2	8.7
Chose not to identify	1	4.3
Total	23	100
Educational level		
Some college	15	65.2
Professional certificate	4	17.4
Bachelor’s degree	5	17.4
Total	23	100

Instrumentation Analysis

I also used SPSS used to conduct a Cronbach's alpha analysis to establish internal consistency reliability among the items on the Blood Pressure Check-Off tool used to measure the dependent variable of blood pressure measurement competency. The Cronbach's alpha values suggest that the items in the tool are closely linked, and the scores generated from the tool are relatively reliable. An alpha level of at least 0.70 is considered an acceptable level (Frankfort-Nachmias & Nachmias, 2008; Green & Salkind, 2014). The value of Cronbach's alpha was 0.74, indicating a satisfactory internal consistency reliability.

Procedure

I conducted a quasi-experimental, posttest-only, quantitative study to compare the effects of multilayered simulation to the effects of the demonstration/return demonstration method. I collected data over a period of 8 days, starting with the collection of demographic data on the participants. Faculty assigned to the nursing fundamentals course used simple randomization to divide the participants into two groups (i.e., the control and experimental groups) for the purpose of performing data collection. On Day 1, I delivered a 45-minute lecture to both groups on the importance of obtaining accurate blood pressure measurements. On Day 2, I met with the control group and delivered a demonstration on the process of obtaining a blood pressure measurement. On Day 3, I met with the experimental group and gave them access to the computer simulation on how to take a blood pressure measurement. On Days 4, 5, and 6, students practiced on a high-fidelity simulation mannequin provided by the school of nursing.

Students were given an opportunity to practice as long as they wished, with regard to building time constraints. Data collection culminated on the final 2 days with return demonstrations on standardized patients using the 29-item Blood Pressure Check-Off tool, consisting of items that are either “met” or “not met” (see Appendix C).

I initially approached students and invited them to participate in this study during their orientation Zoom conference for the fundamentals of nursing course in which they were enrolled. I introduced myself, described the study, and discussed its purpose. A recruitment flyer was posted in the learning management system associated with the course, and consent forms were emailed to each potential participant. Of the 23 students enrolled in the course, all met the inclusion criterion to participate in the study. None of the students had previous exposure to the process of obtaining blood pressure measurements in an ASN program. All 23 students agreed to participate in the study.

The intervention, multilayered simulation, was administered as planned. After a lengthy meeting explaining the study proceedings with course faculty, great care was taken to ensure that the groups remained separated regarding the intervention. No teaching/learning resources were made available regarding blood pressure measurements until after the data collection process was completed. Afterwards, all resources, including the intervention, were made available to all participants.

Results

I conducted an independent-samples *t* test to answer the following research question: What are the effects of multilayered simulation on the skill acquisition of obtaining accurate blood pressure measurements for first-year associate degree nursing (ASN) students in a fundamentals of nursing course when compared to the traditional teaching method of demonstration/return demonstration? The statistical assumptions for performing an independent-samples *t* test include independent observations from each sample and a normal distribution within the two groups: the population that the samples are chosen from and the population having equal variances (Green & Salkind, 2014). The assumption of homogeneity of variance was assessed by the Levene's test, $F = .673$, $p = .421$, which indicated that the equal variance assumption had not been violated; therefore, I used the equal variances assumed version of the *t* test.

The control group included 12 participants, while the experimental group consisted of 11 participants. The independent variable was multilayered simulation, and the dependent variable was the skill acquisition of obtaining accurate blood pressure measurements. The null hypothesis was that there is no significant difference of the effects of multilayered simulation on skill acquisition when compared to the demonstration/return demonstration method. The alternative hypothesis was that there is a significant difference of the effects of multilayered simulation on skill acquisition when compared to the demonstration/return demonstration method. The level of significance chosen for this test was $p = 0.05$ with a confidence level of 95% that results will fall within two standard deviations of the mean. After analyzing the data, I failed to reject the

null hypothesis: (t (21) = 1.19, p = 0.25, two tailed). The results of the t test indicated that there was no significant difference between the effects of multilayered simulation (M = 24.27, SD = 3.04) on skill acquisition when compared to the demonstration/return demonstration method (M = 25.83, SD = 3.22). Table 5 presents the breakdown of the analysis.

Table 5

Results of Independent t *Test*

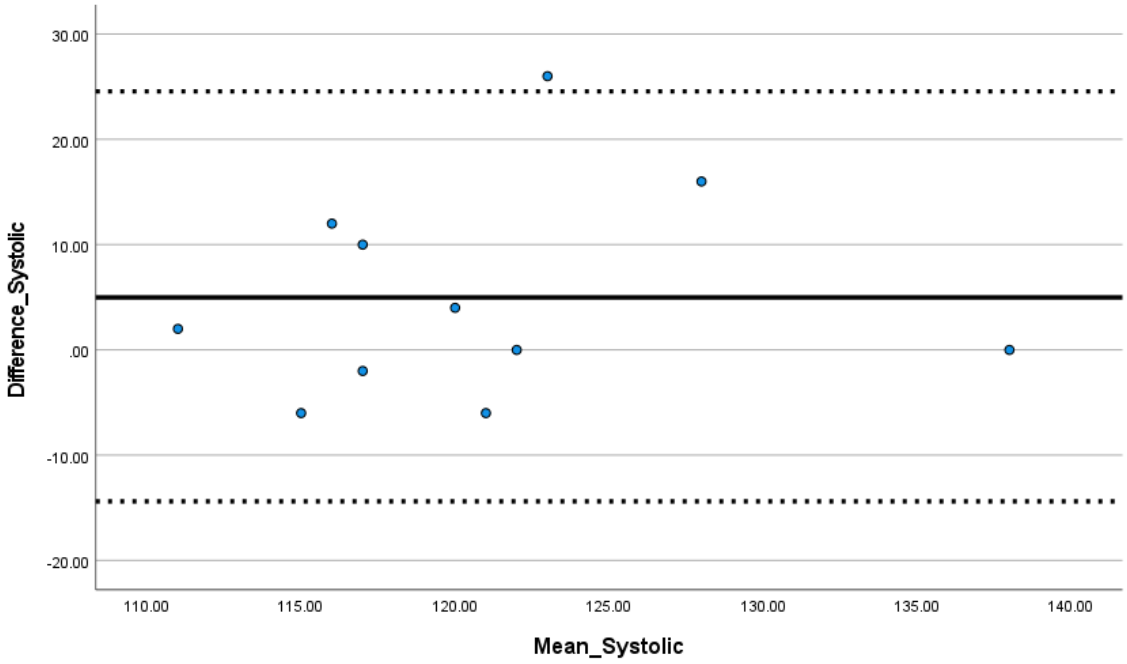
Levene's Test for Equality of Variances		*t* test for Equality of Means						
							95% Confidence Interval of the Difference	
F	Sig.	*t*	*df*	Sig. (2-tailed)	Mean difference	Std. Error difference	Lower	Upper
.673	.421	1.194	21	.246	1.561	1.307	-1.157	4.272

I used a Bland Altman plot to evaluate the differences in systolic blood pressure for each method (i.e., multilayered simulation and demonstration/return demonstration) against the average of the two measurements. A preliminary one-sample t test was nonsignificant (p = .12), which was a necessary requirement to complete the plot. Figure 1 depicts the upper and lower confidence intervals represented with the highest and lowest green lines, respectively. The red centerline represents the average systolic measurement (M = 5.09, SD = 9.93). Upon inspection of the plot, I determined that there is sufficient agreement and that either method could be used to assist in accurate skill acquisition. A regression analysis was subsequently run to assess potential proportional

bias. A nonstatistically significant result (β =.136; t = .413, p = .69) was found, indicating no proportional bias.

Figure 1

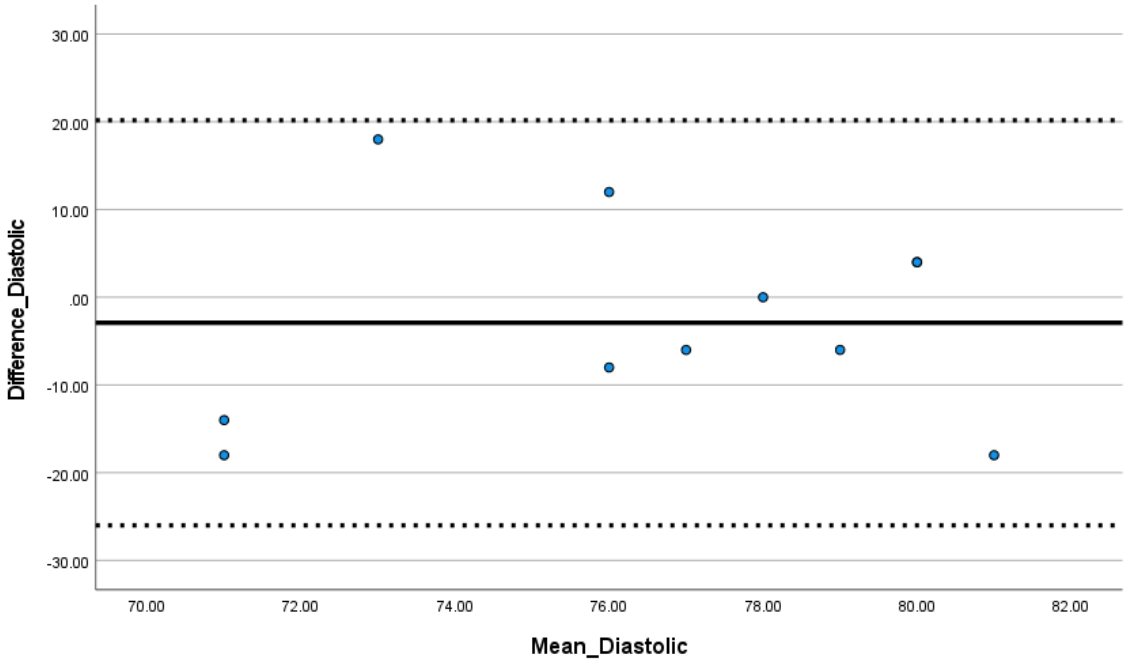
Bland Altman Plot Analysis for Systolic Measures



I also used a Bland Altman plot to evaluate the differences in diastolic blood pressure measurements for each method against the average of the two measurements. The preliminary one-sample t test was nonsignificant (p = .43). Upper and lower confidence intervals are represented with the highest and lowest green lines, respectively, in Figure 2. The red centerline represents the average systolic measurement (M = -2.91, SD = 11.78). As with the systolic measurements, the plot provided evidence that there was sufficient agreement. The regression analysis did not provide a statistically significant result (β =.099; t = .298, p = .78), indicating no proportional bias.

Figure 2

Bland Altman Plot Analysis for Diastolic Measures



I performed a statistical analysis to examine if there is a difference in blood pressure competency between fundamentals of nursing students who receive multilayered simulation training and those who receive demonstration/return demonstration. The independent *t* test analysis of the data revealed no statistical difference between the two instructional methods. The null hypothesis stating that there would be no statistical difference of effects between the two instructional methods was retained. Bland Altman plots were also used to further compare agreement between the valued measures of the two methods. The plots of both the systolic and diastolic measurements revealed close agreement between the two instructional methods indicating that either method could be utilized to assist students in obtaining accurate blood pressure measurements.

Summary

The independent samples *t* test did not produce a significant result. The answer to the research question is that I did not find any statistically significant difference in multilayered simulation and demonstration/return demonstration methods in the skill acquisition of obtaining accurate blood pressure measurements. Bland Altman plots further depicted agreement between the two methods that provide evidence that either method can be used to assist in skill acquisition. I provide explanations and inferences of results in Chapter 5, along with study limitations, recommendations, and implications for further research and social change.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this quantitative study was to determine if there was a difference in blood pressure measurement skill acquisition between fundamentals of nursing students who receive multilayered simulation versus those who receive a faculty-led demonstration. The design for this study involved a posttest-only approach with findings analyzed using an independent samples *t* test and Bland Altman plot analyses. I compared multilayered simulation, the concurrent use of at least two fidelities of simulation, to the more traditional method of demonstration/return demonstration in first-year nursing students enrolled in a fundamentals course. The findings failed to show a statistically significant difference between the two instructional approaches. In addition, the results of the Bland Altman plots revealed an agreement in the accuracy of skill acquisition between the two methods.

This chapter includes an interpretation of the findings of this study. I discuss how the findings confirm, disconfirm, or provide an extension to the discipline of nursing. An interpretation of the findings in relation to the theoretical framework is also provided. Additionally, I address the limitations to generalizability, trustworthiness, validity, and reliability as well as propose recommendations for further research. The chapter concludes with a discussion about how the findings may be applied to influence positive social change.

Interpretation of Findings

I compared the effects of multilayered simulation to the traditional method of demonstration/return demonstration when teaching blood pressure determination to

prelicensure nursing students. The findings from this study failed to show a statistically significant difference between the two teaching methods. The use of simulation has evolved from being merely supplementary to becoming an essential component in the curricula of nursing education (Aebersold, 2018; Bryant et al., 2020; Padilha et al., 2018). Several studies have provided support endorsing the use of simulation in nursing education as an effective teaching method (Cant & Cooper, 2019; Fonseca et al., 2016; Sittner et al., 2015). Teaching strategies, such as demonstration/return demonstration, have conventionally been used to support nursing students in the acquisition of psychomotor skills like blood pressure measurements (Caputi & Engelmann, 2005). These types of approaches are faculty-mediated and involve a large amount of faculty control and direction. Contemporary approaches, like multilayered simulation, are more student directed with students receiving consistent content and instruction (Choi et al., 2020; Griffin et al., 2016; Masha'al & Rababa, 2020). With faculty-led instruction like demonstration/return demonstration, time must be made for faculty to provide the demonstration to all students. Technology-based teaching methods are needed to meet societal changes, address diverse needs, and advance the profession of nursing (Jeffries, 2001). The results from the current study confirms this stance. Although the results were not statistically significant, both groups performed comparably during the return demonstration. More specifically, most participants in both groups were able to obtain a blood pressure measurement with 2 mm Hg for the systolic and/or diastolic measurement when compared to the faculty's interpretation. This finding provides support that

multilayered simulation can be an effective tool in helping students acquire the psychomotor skill of obtaining blood pressure measurements.

The findings from this study also offer an extension of knowledge to the discipline of nursing by providing evidence of the effective use of multilayered simulation in nursing education. The use of simulation has been heavily supported in health care educational programs, including nursing (Brauneis et al., 2021; Mahmood et al., 2021; Martin et al., 2020; Mitchell et al., 2020). The results from this study provide evidence that using multiple layers of simulation can successfully assist students in acquiring a skill. The results of the current study align with those of several quantitative studies that posited that simulation is an effective tool for teaching clinical skills (Janicas & Narchi, 2016; Park et al., 2017; Smith & Hamilton, 2015). The findings of the current study also align with those of qualitative research positing that simulation can be an effective teaching strategy in a safe environment (Amod & Brysiewicz, 2019; Crafford et al., 2019; Kapucu, 2017). Although there was a scarcity of literature found that explores the use of multilayered simulation in health care, the results from the current study support the evidence provided by Schlicher and Eyck's (2008) research on multilayered simulation.

The theoretical framework that guided this study was Kolb's experiential learning theory. In the theory, Kolb (1984) postulated that learning is a process that is accentuated through a transformative experience. Kolb further suggested that a four-stage learning cycle can be used to create the transformative experience. The four stages are a concreate experience, reflective observation, abstract conceptualism, and reflective observation.

The results from this study aligned with Kolb's four-stages of experiential learning through the creation of a learning experience with multilayered simulation. It is feasible to posit that this study confirms the position that Kolb's theory is a reliable framework in that it not only underpinned this research but can also be used to guide research in nursing education.

Limitations of the Study

I used a quantitative, posttest-only design in this study, which has a potential bias due to lack of generalizability (see Grove et al., 2013). Generalizability is the extent to which findings from research can be applied to individuals in a population other than those included in the sample (Polit & Beck, 2008). A posttest-only design offers no pretest to provide a link between treatment and change. The participants in the current study did not have adequate knowledge on how to appropriately obtain a blood pressure measurement; therefore, a pretest would not have been feasible. Probability sampling describes a sampling process that randomly chooses participants to characteristically represent the chosen population (Houser, 2015). I used convenience sampling to obtain participants for this study as true probability sampling was not feasible. The sample came from the participants that were available in the fundamentals of nursing course at the institution where data were collected. This method may limit the generalizability of my findings.

The power analysis conducted for this research study determined that 52 participants were needed to examine the hypothesis and establish a confidence level of 95%. I was only able to retain a sample of 23 participants for several reasons. The

institution where I performed data collection wanted to be the IRB of record. Due to the effects of the coronavirus pandemic, an ongoing institutional accreditation process, and two hurricanes, I was unable to obtain approval in as timely of a manner as previously planned. It is important to note that results may have been different with a more appropriate sample size.

I limited my research to first-year students enrolled in a fundamentals of nursing course in an ASN program in Louisiana; however, some first-year students may be enrolled in a fundamentals of nursing course in a BSN program. Another limitation of this research was that data were collected at one university, notably a historically Black college. Most of the participants were Black, non-Hispanic students. These findings might also limit generalizability of the study.

Recommendations

In this study, I focused on first-year students enrolled in a fundamentals of nursing course in an ASN program. A replication of this study can be performed at multiple sites in Louisiana. Further research could also be undertaken at nursing education institutions across the United States. Quantitative research may be necessary to examine the effects of multilayered simulation on students enrolled in a fundamentals of nursing course in a BSN program. A qualitative study that examines the perceptions of first-year nursing students on the use of multilayered simulation as a teaching strategy could be used to extend literature on student-centered teaching strategies in nursing education. Relevant research could also be conducted to examine the effects of

multilayered simulation on other psychomotor skills students must acquire in nursing education.

Implications

Implications to the Discipline

The inherent need for an overhaul in nursing education curricula has been reported by nursing education experts and reinforced by the National Academy of Medicine to meet the complex needs of aging patients and an ever-changing health care system (Benner, 2010; Institute of Medicine, 2010). Several studies have provided evidence that methods like simulation can be used as effective strategies to assist students in acquiring needed knowledge and skills (Cant & Cooper, 2017; Goodstone et al., 2013; Skrable & Fitzsimons, 2014; Wane & Lotz, 2013). Nurse educators are progressively using methods involving simulation to assist students in learning standards of nursing science in a secure and harmless environment.

This study can impact positive social change by providing evidence that student-centered methods like multilayered simulation can be effectively employed in undergraduate nursing education curricula. Multilayered simulation provides continuity of disseminated information and ensures that students receive the same content. Faculty-led approaches like demonstration/return demonstration are given from the faculty's perspective, so there may be subtle differences in the delivery of the demonstration and, therefore, the content. Approaches like multilayered simulation provide an opportunity for students to learn outside of the traditional classroom and acquire knowledge and skills at a quicker pace when compared to more traditional learning methods like

demonstration/return demonstration. This can potentially change the way skills are acquired in nursing education. Virtual education is becoming a mainstay today, especially with the current coronavirus pandemic situation that occurred during the planning and implementation of this study. To meet the demands of an ever-changing health care system and society in general, more innovative instructional methods are needed.

Theoretical Implications

The findings from this study provided evidence to support the use of Kolb's theory of experiential learning to guide experiential learning experiences using simulation, including multilayered simulation, in nursing education. Insights gained from this research study imply that Kolb's four-stage learning process can be appropriately and successfully integrated into methods similar to the multilayered simulation experience. Through the application of a concrete experience, nursing students will be able to reflect on and conceptualize the experience to provide active demonstration of the chosen skill.

Conclusion

Although no statistically significant differences were found between the experimental and control group, the results did provide evidence that novel approaches, such as multilayered simulation, could potentially be integrated as an effective teaching strategy in nursing education curricula. I made several recommendations for further research that stemmed from the results of this research study, which, if carried out, could further extend the body of knowledge in the discipline of nursing. Integrating methods, such as multilayered simulation, into the nursing education curricula could impact social change regarding the nursing profession on many different levels. Not only could nursing

education be positively affected, but the effects could also extend to how nurses provide care in a health care system that is persistently evolving.

.

References

Aebersold, M. (2018). Simulation-based learning: No longer a novelty in undergraduate education. *OJIN: The Online Journal of Issues in Nursing, 23*(2). https//doi.org/10.3912/OJIN.Vol23No02PPT39

Albert, N. M., & O'Connor, P. C. (2012). How many subjects do I need in my research sample? *Clinical Nurse Specialist, 26*(6), 302–304. https://doi.org/10.1097/NUR.0b013e31826fa91c

American Association of Colleges of Nursing. (2017). *Fact sheet: Nursing shortage*. AACN. https://www.aacnnursing.org/Portals/42/News/Factsheets/Nursing-Shortage-Factsheet-2017.pdf?ver=2017-10-18-144118-163&ver=2017-10-18-144118-163

Amod, H. B., & Brysiewicz, P. (2019). Promoting experiential learning through the use of high-fidelity human patient simulators in midwifery: A qualitative study. *Curationis, 42*(1), 1–7. https://doi.org/10.4102/curationis.v42i1.1882

Assessment Technologies Institute, Inc. (2015). *Educator implementation guide: Skills module series.* https://atitesting.com/docs/default-source/product-integration/skills-modules/atin-skillsmodules-eig_2015-07-16.pdf?sfvrsn=2

Assessment Technologies Institute, Inc. (2019). *ATI by the numbers*. https://www.atitesting.com/educator/about/by-the-numbers

Bastable, S. B. (2003). *Nurse as educator: Principles of teaching and learning for nursing practice*. Jones & Bartlett Learning.

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

Berman, A., & Snyder, S.J. (2016). *Clinical skills in nursing* (8th ed.). Pearson Education Inc.

Billings, D. M., & Halstead, J. A. (2009). *Teaching in nursing: A guide for faculty* (3rd ed.). Saunders Elsevier.

Bland, A. J., Topping, A., & Wood, B. (2011). A concept analysis of simulation as a learning strategy in the education of undergraduate nursing students. *Nurse Education Today, 31*(7), 664-670. https://doi.org/10.1016/j.nedt.2010.10.013

Bliss, M., & Aitken, L. M. (2018). Does simulation enhance nurses' ability to assess deteriorating patients? *Nurse Education in Practice, 28*, 20–26. https://doi.org/10.1016/j.nepr.2017.09.009

Brauneis, L., Badowski, D., Maturin, L., & Simonovich, S. D. (2021). Impact of low-fidelity simulation-based experiences in a pharmacology classroom setting in prelicensure graduate nursing education. *Clinical Simulation in Nursing, 50*, 43–47. https://doi.org/10.1016/j.ecns.2020.10.002

Bryant, K., Aebersold, M. L., Jeffries, P. R., & Kardong-Edgren, S. (2020). Innovations in simulation: Nursing leaders' exchange of best practices. *Clinical Simulation in Nursing*, *41*, 33. https://doi.org/10.1016/j.ecns.2019.09.002

Bussard, M. E. (2015). Clinical judgment in reflective journals of prelicensure nursing students. *The Journal of Nursing Education, 54*(1), 36–40. https://doi.org/10.3928/01484834-20141224-05

Cant, R. P., & Cooper, S. J. (2017). Use of simulation-based learning in undergraduate nurse education: An umbrella systematic review. *Nurse Education Today, 4963*(71). https://doi.org/10.1016/j.nedt.2016.11.015

Cant, R. P., & Cooper, S. J. (2019). Bibliometric scan of the 100 most cited nursing simulation articles. *Clinical Simulation in Nursing, 36*, 1–7. https://doi.org/10.1016/j.ecns.2019.06.004

Cantey, D. S., Randolph, S. D., Molloy, M. A., Carter, B., & Cary, M. P. (2017). Student-developed simulations: Enhancing cultural awareness and understanding social determinants of health. *Journal of Nursing Education, 56*(4), 243. https://doi.org/10.3928/01484834-20170323-11

Caputi, L., & Engelmann, L. (2005). *Teaching nursing: The art and science*. College of DuPage Press

Choi, H., Lee, U., Jeon, Y. S., & Kim, C. (2020). Efficacy of the computer simulation-based, interactive communication education program for nursing students. *Nurse Education Today, 91*. https://doi.org/10.1016/j.nedt.2020.104467

Chhugani, M., & James, M. M. (2017). Skill building in nursing students during pre-service training. *International Journal of Nursing & Midwifery Research, 4*(4), 4. https://doi.org/10.24321/2455.9318.201745

Claman, F. L. (2015). The impact of multiuser virtual environments on student engagement. *Nurse Education in Practice, 15*(1), 13–16. https://doi.org/10.1016/j.nepr.2014.11.006

Cook, S. E. (2015). Full integration of simulation in an associate degree nursing program. *Teaching & Learning in Nursing, 10*(1), 19-24. https://doi.org/10.1016/j.teln.2014.07.004

Costello, M., Prelack, K., Faller, J., Huddleston, J., Adly, S., & Doolin, J. (2018). Student experiences of interprofessional simulation: Findings from a qualitative study. *Journal of Interprofessional Care, 32*(1), 95–97. https://doi.org/10.1080/13561820.2017.1356810

Crafford, I., Kilian, C., Moore-Saayman, R., Dreyer, J., & Rossouw, M. (2019). Learning in simulation: Ready? Steady? GO! *Professional Nursing Today, 23*(1), 35.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (Laureate Education, custom ed.). Sage.

Cunningham, S., Foote, L., Sowder, M., & Cunningham, C. (2018). Interprofessional education and collaboration: A simulation-based learning experience focused on common and complementary skills in an acute care environment. *Journal of Interprofessional Care, 32*(3), 395–398. https://doi.org/10.1080/13561820.2017.1411340

Curran, V., Fleet, L., White, S., Bessell, C., Deshpandey, A., Drover, A., Hayward, M., & Valcour, J. (2015). A randomized controlled study of manikin simulator fidelity on neonatal resuscitation program learning outcomes. *Advances in Health Sciences Education: Theory and Practice, 20*(1), 205–218. https://doi.org/10.1007/s10459-014-9522-8

Davila, Yvonne A., "QSEN Competency Confidence Levels in Two Groups of New Registered Nurses" (2019). *Walden Dissertations and Doctoral Studies*. 6549. https://scholarworks.waldenu.edu/dissertations/6549

de Lima Lopes, J., Negrão Baptista, R. C., Takao Lopes, C., Bertelli Rossi, M., Swanson, E. A., & de Barros, A. L. B. L. (2019). Efficacy of a video during bed bath simulation on improving the performance of psychomotor skills of nursing undergraduates: A randomized clinical trial. *International Journal of Nursing Studies, 99,* 103333. https://doi.org/10.1016/j.ijnurstu.2019.04.001

Eyikara, E., & Baykara, Z. G. (2018). Effect of simulation on the ability of first year nursing students to learn vital signs. *Nurse Education Today, 60*, 101–106. https://doi.org/10.1016/j.nedt.2017.09.02

Fan-Ko, S., Long, A., Chun-Ying, C., Hui-Man, H., Yu-Chieh, H., & Yao, Y. (2018). Rationale underpinning postgraduate student nurses' choice of research methods used for their masters' theses. *Nurse Education in Practice, 33*, 127-132. https://doi.org/10.1016/j.nepr.2018.10.002

Ferguson, N. F., & Estis, J. M. (2018). Training students to evaluate preterm infant feeding safety using a video-recorded patient simulation approach. *American Journal of Speech-Language Pathology*, *27*(2), 566–573. https://doi.org/10.1044/2017_AJSLP-16-0107

Fèvre, E. (2008). *Bland-Altman plot: Measuring agreement between methods* [PDF]. http://imaging.mrc-cbu.cam.ac.uk/statswiki/FAQ/balt?action=AttachFile&do=get&target=balt.pdf

Fewster-Thuente, L., & Batteson, T. J. (2018). Kolb's experiential learning theory as a theoretical underpinning for interprofessional education. *Journal of Allied Health, 47*(1), 3-8.

Fonseca, L. M. M., Aredes, N. D. A., Fernandes, A. M., Batalha, L. M. D. C., Apóstolo, J. M. A., Martins, J. C. A., & Rodrigues, M. A. (2016). Computer and laboratory simulation in the teaching of neonatal nursing: innovation and impact on learning. *Revista Latino-Americana de Enfermagem, 24*. https://doi.org/10.1590/1518-8345.1005.2808

Foronda, C., Liu, S., & Bauman, E. B. (2013). Evaluation of simulation in undergraduate nurse education: An integrative review. *Clinical Simulation in Nursing, 9*(10), e409-e416. https://doi.org/10.1016/j.ecns.2012.11.003

Frankfort-Nachmias, C., & Nachmias, D. (2008). *Research methods in the social sciences* (7th ed.). Worth.

Gharaibeh, B., Hweidi, I., & Al-Smadi, A. (2017). Attitudes and perception of baccalaureate nursing students toward educational simulation. *Cogent Education, 4*(1). https://doi.org/10.1080/2331186X.2017.1360063

Giavarina, D. (2015). Understanding Bland Altman analysis. *Biochemia Medica, 25*(2), 141–151. https://doi.org/10.11613/BM.2015.015

Goodstone, L., Goodstone, M. S., Cino, K., Glaser, C. A., Kupferman, K., & Dember-Neal, T. (2013). Effect of simulation on the development of critical thinking in associate degree nursing students. *Nursing Education Perspectives, 34*(3), 159-162.

Green, S. B., & Salkind, N. J. (2014). *Using SPSS for Windows and Macintosh: Analyzing and understanding data* (7th ed.). Pearson

Greenberger, H. B., & Dispensa, M. (2015). Usage and perceived value of video podcasts by professional physical therapist students in learning orthopedic special tests. *Journal of Physical Therapy Education, 29*(3), 46-57. https://doi.org/10.1097/00001416-201529030-00007

Griffin, K., McLeod, M., Francis, K., & Brown, A. M. (2016). Do dummies make good teachers? A paradigm shift for clinical educators. *Collegian, 23*(3), 321–326. https://doi.org/10.1016/j.colegn.2015.06.005

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The practice of nursing research: Appraisal, synthesis, and generation of evidence* (7th ed.). Elsevier Saunders.

Houser, J. (2015). *Nursing research: Reading, using, and creating evidence* (3rd ed.). Jones & Bartlett Learning, LLC

Hull, E. (2017). Conducting research in your own backyard. *Teaching and Learning in Nursing, 12*(4), 232-233. https://doi.org/10.1016/j.teln.2017.06.011

Hurst, K. M. (2016). Using video podcasting to enhance the learning of clinical skills: A qualitative study of physiotherapy students' experiences. *Nurse Education Today, 45*, 206-211. https://doi.org/10.1016/j.nedt.2016.08.011

Institute of Medicine. (2010). *The future of nursing: Leading change, advancing health* [Report brief]. http://www.iom.edu/~/media/Files/Report%20Files/2010/The-Future-of-Nursing/Future%20of%20Nursing%202010%20Report%20Brief.pdf

Janicas, R. D. C. V., & Narchi, N. Z. (2016). Opinion of nursing undergraduates on the use of simulation as a teaching strategy. *Journal of Nursing Education and Practice, 6*(3), 26. https://doi.org/10.5430/jnep.v6n3p26

Jeffries, P. R. (2001). Computer versus lecture: A comparison of two methods of teaching oral medication administration in a nursing skills laboratory. *Journal of Nursing Education, 7*, 323.

Kapucu, S. (2017). The effects of using simulation in nursing education: A thorax trauma case scenario. *International Journal of Caring Sciences, 10*(2), 1069.

Kelly, M. A., Berragan, E., Husebø, S. E., & Orr, F. (2016). Simulation in nursing education-international perspectives and contemporary scope of practice. *Journal of Nursing Scholarship, 48*(3), 312–321. https://doi.org/10.1111/jnu.12208

Kim, S. H., Issenberg, B., & Roh, Y. S. (2019). The effects of simulation-based advanced life support education for nursing students. *Computers, Informatics, Nursing: CIN, 38*(5), 240-245. https://doi.org/10.1097/CIN.0000000000000560

Kinder, F. D., & Kurz, J. M. (2018). Gaming strategies in nursing education. *Teaching and Learning in Nursing, 13*(4), 212–214. https://doi.org/10.1016/j.teln.2018.05.001

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Prentice Hall, Inc.

Kolb, D. A. & Fry, R. E. (1975). Towards an applied theory of experiential learning. In C. Cooper (Ed.), *Theories of group processes* (pp. 33-57). John Wiley & Sons.

Koplow, S., Morris, M., Rone-Adams, S., Hettrick, H., Litwin, B., Soontupe, L. B., & Vatwani, A. (2020). Student experiences with engagement in a nursing and physical therapy interprofessional education simulation. *Internet Journal of Allied Health Sciences & Practice, 18*(1), 1–9. https://nsuworks.nova.edu/ijahsp/vol18/iss1/3/

Kunst, E. L., Mitchell, M., & Johnston, A. N. B. (2017). Using simulation to improve the capability of undergraduate nursing students in mental health care. *Nurse Education Today, 50*, 29–35. https://doi.org/10.1016/j.nedt.2016.12.012

Lanz, A. S., & Wood, F. G. (2018). Communicating patient status: Comparison of teaching strategies in prelicensure nursing education. *Nurse Educator, 43*(3), 162–165. https://doi.org/10.1097/NNE.0000000000000440

Lewis, D. Y., & Ciak, A. D. (2011). The impact of a simulation lab experience for nursing students. *Nursing Education Perspectives, 32*(4), 256-258. https://doi.org/10.5480/1536-5026-32.4.256

Li, S. (2007). *The role of simulation in nursing education: A regulatory perspective.* https://ncsbn.org/Suling2.pdf

Liaw, S. Y., Rashasegaran, A., Wong, L. F., Deneen, C. C., Cooper, S., Levett-Jones, T., Goh, H. S., & Ignacio, J. (2018). Development and psychometric testing of a Clinical Reasoning Evaluation Simulation Tool (CREST) for assessing nursing students' abilities to recognize and respond to clinical deterioration. *Nurse Education Today, 62*, 74–79. https://doi.org/10.1016/j.nedt.2017.12.009

Lillekroken, D. (2020). “A privilege but also a challenge.” Nurse educators’ perceptions about teaching fundamental care in a simulated learning environment: A qualitative study. *Journal of Clinical Nursing 29*(11/12), 2011–2022. https://doi.org/10.1111/jocn.15177

Louisiana State Board of Nursing (n.d.) *Louisiana State Board of Nursing 2017 annual report*. https://www.lsbn.state.la.us/Portals/1/Documents/AnnualReport/AnnualReport2017.pdf

MacKinnon, K., Marcellus, L., Rivers, J., Gordon, C., Ryan, M., & Butcher, D. (2015). Student and educator experiences of maternal-child simulation-based learning: a systematic review of qualitative evidence protocol. *JBI Database of Systematic Reviews and Implementation Reports*, *13*(1), 14–26. https://doi.org/10.11124/jbisrir-2015-1694

Mahmood, L. S., Mohammed, C. A., & Gilbert, J. H. V. (2021). Interprofessional simulation education to enhance teamwork and communication skills among medical and nursing undergraduates using the TeamSTEPPS® framework. *Medical Journal Armed Forces India, 77*, S42–S48. https://doi.org/10.1016/j.mjafi.2020.10.026

Martin, A., Cross, S., & Attoe, C. (2020). The use of in situ simulation in healthcare education: Current perspectives. *Advances in Medical Education and Practice, 11*, 893–903. https://doi.org/10.2147/AMEP.S188258

Masha'al, D., & Rababa, M. (2020). Nursing students' perceptions towards branching path simulation as an effective interactive learning method. *Teaching and Learning in Nursing, 15*(4), 218-225. https://doi.org/10.1016/j.teln.2020.05.002

McConnell, M. M., Monteiro, S., & Bryson, G. L. (2019). Sample size calculations for educational interventions: principles and methods. *Canadian Journal of Anaesthesia, 66*(8), 864–873. https://doi.org/10.1007/s12630-019-01405-9

McCusker, K., & Gunaydin, S. (2015). Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion, 30*(7), 537-542. http://doi.org/10.1177/0267659114559116

McEnroe-Petitte, D., & Farris, C. (2020). Using gaming as an active teaching strategy in nursing education. *Teaching & Learning in Nursing, 15*(1), 61–65. https://doi.org/10.1016/j.teln.2019.09.002

McEwen, M., & Wills, E. M. (2014). *Theoretical basis for nursing* (4th ed.). Wolters Kluwer Health/Lippincott Williams and Wilkins

McLeod, S. (2017). *Kolb – Learning styles*. https://www.simplypsychology.org/ learning-kolb.html

Mitchell, M., Bernie, C., Newall, F., & Williams, K. (2020). Simulation-based education for teaching aggression management skills to health care providers in the acute health care setting: a systematic review protocol. *Systematic Reviews, 9*(1), 1–10. https://doi.org/10.1186/s13643-020-01466-8

Morrell-Scott, N. (2018). Confidence and deeper learning: Simulated practice within pre-registration nurse education. *British Journal of Nursing, 27*(14), 827–830. https://doi.org/10.12968/bjon.2018.27.14.827

Norman, G., Dore, K., & Grierson, L. (2012). The minimal relationship of simulation fidelity and transfer of learning. *Medical Education 46*(7), 636-647. https://doi.org/10.1111/j.1365-2923.2012.04243.x

Padilha, J. M., Machado, P. P., Ribeiro, A. L., & Ramos, J. L. (2018). Clinical virtual simulation in nursing education. *Clinical Simulation in Nursing, 15*, 13–18. https://doi.org/10.1016/j.ecns.2017.09.005

Park, H. R., Park, J. W., Kim, C. J., & Song, J. E. (2017). Development and validation of simulation teaching strategies in an integrated nursing practicum. *Collegian, 24*(5), 479–486. https://doi.org/10.1016/j.colegn.2016.10.007

Polit, D. F., & Beck, C. T. (2008). *Nursing Research: Generating and assessing evidence for nursing practice* (8th ed.). Lippincott Williams & Williams.

Potter, P.A., Perry, A.G., Stockert, P.A., & Hall, A.M. (2017) *Fundamentals of Nursin*g (9th ed.). Elsevier.

Pisciottani, F., França da Rocha, D., da Costa, M. R., Figueiredo, A. E., & Ramos Magalhães, C. (2017). In situ simulation in cardiopulmonary resuscitation: Implications for permanent nursing education. *Journal of Nursing UFPE / Revista de Enfermagem UFPE, 11*(7), 2810–2815. https://doi.org/10.5205/reuol.9799-86079-1-RV.1106sup201722

Rudestam, K. E., & Newton, R. R. (2015). *Surviving your dissertation: A comprehensive guide to content and process* (4th ed.). Sage.

Ryan, G. (2018). Introduction to positivism, interpretivism and critical theory. *Nurse Researcher*, *25*(4), 14. http://doi.org/10.7748/nr.2018.e1466

Salari, M., Roozbehi, A., Zarifi, A., & Tarmizi, R. A. (2018). Pure PBL, hybrid PBL and lecturing: Which one is more effective in developing cognitive skills of undergraduate students in pediatric nursing course? *BMC Medical Education*, *18*(1), 195. https://doi.org/10.1186/s12909-018-1305-0

Sarasnick, J. A., Pyo, K. A., & Draper, J. (2017). Using simulation and case studies combined to improve student knowledge: A retrospective study. *Nursing Education Perspectives*, *38*(3), 126–130. https://doi.org/10.1097/01.NEP.0000000000000139

Sarman, S., & Pardi, K. W. (2019). Satisfaction and confidence in using clinical simulation models among undergraduate nursing students in a public university in malaysia: A cross-sectional study. *International Journal of Nursing Education, 11*(4), 130–134. https://doi.org/10.5958/0974-9357.2019.00104.1

Sarmasoglu, S., Dinç, L., & Elçin, M. (2016). Using standardized patients in nursing education: Effects on students' psychomotor skill development. *Nurse Educator, 41*(2), E1–E5. https://doi.org/10.1097/NNE. 0000000000000188

Schlicher, N. (2008). 7 layered simulation: A novel approach to medical malpractice education. *Academic Emergency Medicine, 15*, S228. https://doi.org/10.1111/j.1553-2712.2008.00131_7.x

Schlicher, N. R. & Eyck, R. P. T. (2008). Medical malpractice: Utilization of layered simulation for resident education. *Academic Emergency Medicine, 15*(11), 1175-1180. https://doi.org/10.1111/j.1553-2712.2008.00165.x

Shin, S., Park, J. H., & Kim, J. H. (2015). Effectiveness of patient simulation in nursing education: Meta-analysis. *Nurse Education Today, 35*(1), 176-182. https://doi.org/10.1016/j.nedt.2014.09.009

Sittner, B. J., Aebersold, M. L., Paige, J. B., Graham, L. L. M., Schram, A. P., Decker, S. I., & Lioce, L. (2015). INACSL standards of best practice for simulation: Past, present, and future. *Nursing Education Perspectives, 36*(5), 294–298. https://doi.org/10.5480/15-1670

Skrable, L., & Fitzsimons, V. (2014). Simulation in associate degree nursing education: A literature review. *Teaching & Learning in Nursing, 9*(3), 120-125. https://doi.org/10.1016/j.teln.2014.03.001

Smith, P. C., & Hamilton, B. K. (2015). The effects of virtual reality simulation as a teaching strategy for skills preparation in nursing students. *Clinical Simulation in Nursing, 11*(1), 52-58. https://doi.org/10.1016/j.ecns.2014.10.001

Smith, S.F., Duell, D.J., Martin, B.C., Aebersold, M.L., & Gonzalez, L. (2017). *Clinical nursing skills: Basic to advanced skills* (9th ed.). Pearson

Soares de Freitas, C. C., de Sousa Martins Melo, G., Fernandes Costa, I. K., Pergola-Marconato, A. M., Pinto Tibúrcio, M., & de Vasconcelos Torres, G. (2016). Failures related to the measurement of blood pressure among nursing students. *Rev Rene, 17*(5), 699–706. https://doi.org/10.15253/2175-6783.2016000500016

Soccio, D. A. (2017). Effectiveness of mental health simulation in replacing traditional clinical hours in baccalaureate nursing education. *Journal of Psychosocial Nursing & Mental Health Services, 55*(11), 36–43. https://doi.org/10.3928/02793695-20170905-03

Society for Simulation in Healthcare. (2018). *About simulation*. https://www.ssih.org/About-SSH/About-Simulation

Stanley, M. J., Serratos, J., Matthew, W., Fernandez, D., & Dang, M. (2018). Integrating video simulation scenarios into online nursing instruction. *Journal of Nursing Education, 57*(4), 245-249. http://doi.org/10.3928/01484834-20180322-11

Stone, R., Cooke, M., & Mitchell, M. (2020). Exploring the meaning of undergraduate nursing students' experiences and confidence in clinical skills using video. *Nurse Education Today, 86*, 104322. https://doi.org/10.1016/j.nedt.2019.104230

Thompson, L. M., Zablotska, L. B., Chen, J., Jong, S., Alkon, A., Soo-Jeong, L., & Vlahov, D. (2018). Development of quantitative research skills competencies to improve doctor of philosophy nursing student training. *Journal of Nursing Education, 57*(8), 483-488. http://doi.org/10.3928/01484834-20180720-06

Todd, M., Manz, J. A., Hawkins, K. S., Parsons, M. E., & Hercinger, M. (2008). The development of a quantitative evaluation tool for simulations in nursing education. *International Journal of Nursing Education Scholarship, 5*(1), 1-17. https://doi.org/10.2202/1548-923X.1705

Trochim, W. M. K. (2006). *Positivism & post-positivism*. http://www.socialresearchmethods.net/kb/positvsm.php

Verkuyl, M., & Hughes, M. (2019). Virtual gaming simulation in nursing education: A mixed-methods study. *Clinical Simulation in Nursing, 29*, 9–14. https://doi.org/10.1016/j.ecns.2019.02.001

Walden University. (2020). *Center for research quality.* https://academicguides.waldenu.edu/researchcenter/orec/frequently-asked-questions/educational-settings

Wane, D., & Lotz, K. (2013). The simulated clinical environment as a platform for refining critical thinking in nursing students: A pilot program. *Nursing Education Perspectives (National League for Nursing), 34*(3), 163-166.

Williams, P. (2018). *Dewit's fundamental concepts and skills for nursing* (5th ed.). Elsevier

Williams, T. (2019). Using high fidelity simulation to prepare baccalaureate nursing students enrolled in a historically Black college and university. *ABNF Journal, 30*(2), 37–43.

Wright, R. R., Tinnon, E. A., & Newton, R. H. (2018). Evaluation of vSim for nursing in an adult health nursing course: A multisite pilot study. *CIN: Computers, Informatics, Nursing, 36*(2), 84–89. https://doi.org/10.1097/CIN.0000000000000388

Wyllie, E., & Batley, K. (2019). Skills for safe practice – A qualitative study to evaluate the use of simulation in safeguarding children teaching for pre-registration children's nurses. *Nurse Education in Practice, 34*, 85–89. https://doi.org/10.1016/j.nepr.2018.11.009

Yoost, B. L. & Crawford, L. R. (2016). *Fundamentals of nursing: Active learning for collaborative practice.* Elsevier.

Appendix A: Power Analysis from G*Power

t tests – Means: Difference between two independent means (two groups)

Analysis:	A priori: Compute required sample size		
Input:	Tail(s)	=	Two
	Effect size d	=	0.8
	α err prob	=	.05
	Power (1−β err prob)	=	.8
	Allocation ratio N2/N1	=	1
Output:	Noncentrality parameter δ	=	2.8844410
	Critical t	=	2.0085591
	Df	=	50
	Sample size group 1	=	26
	Sample size group 2	=	26
	Total sample size	=	52
	Actual power	=	0.8074866SSS

Appendix B: Demographic Questionnaire

1. What is your age?
    - 18-20
    - 21-29
    - 30-39
    - 40-49
    - 50-59
    - 60 or older

2. What is your race/ethnicity?
    - African American
    - Asian American
    - Caucasian
    - Hispanic American
    - Native American
    - Other _____

3. What is your gender?
    - Male
    - Female
    - Other _____

4. What is your educational level?
    - High school degree or equivalent (e.g., GED)
    - Some college but no degree
    - Associate degree
    - Bachelor degree
    - Graduate degree

Appendix C: Blood Pressure Skills Checkoff Tool

Measuring Blood Pressure (Page 1 of 2)			
	Performed	**Met (1)**	**Not Met (2)**
1.	Determine need to assess client's BP.		
2.	Determine best site for BP assessment.		
3.	Select appropriate cuff size.		
4.	Determine previous baseline BP (if available) from client's record.		
5.	Encourage client to avoid exercise and smoking for 30 minutes before assessment of BP.		
6.	Perform hand hygiene. Assist client to sitting or lying position. Make sure room is warm, quiet, and relaxing.		
7.	Explain to client that BP is to be assessed and have client rest at least 5 minutes before measurement is taken. Ask client not to speak while BP is being measured.		
8.	With client sitting or lying, position client's forearm or thigh and provide support if needed.		
9.	Expose extremity by removing constricting clothing		
10.	Palpate brachial artery or popliteal artery. Position cuff 2.5 cm above site of pulsation. Center bladder of cuff above artery. With cuff fully deflated, wrap cuff evenly and snugly around upper arm.		
11.	Position manometer vertically at eye level, no more than 1 m away from client.		
12.	To determine baseline BP (two-step method), palpate artery distal to cuff with fingertips of one hand while inflating cuff rapidly to pressure 30 mm Hg above point at which pulse disappears. Slowly deflate cuff and note point when pulse reappears. Deflate cuff fully and wait 30 seconds.		
13.	Place stethoscope earpieces in ears.		
14.	Relocate brachial or popliteal artery and place bell or diaphragm chestpiece of stethoscope over it.		
15.	Close valve or pressure bulb clockwise until tight. Inflate cuff to 30 mm Hg above palpated systolic pressure.		
16.	Slowly release valve and allow mercury to fall at rate of 2 to 3 mm Hg/sec.		

Measuring Blood Pressure (Page 2 of 2)			
	Performed	**Met (1)**	**Not Met (2)**
17.	Note point on manometer when first clear sound is heard.		
18.	Continue to deflate cuff, noting point at which muffled or dampened sound appears.		
19.	Continue to deflate cuff gradually, noting point at which sound disappears. Note pressure to nearest 2 mm Hg. Listen to 10 – 20 mm Hg after the last sound, then allow remaining air to escape quickly.		
20.	Deflate cuff rapidly and completely. Remove cuff from client's arm unless measurement must be repeated. If this is the first assessment of the client, repeat procedure on other arm.		
21.	Assist client in returning to a comfortable position and cover upper arm if previously clothed.		
22.	Perform hand hygiene		
23.	Discuss findings with client as needed.		
24.	Compare reading with previous baseline and/or acceptable BP for client's age group.		
25.	Compare BP in both of client's arms or legs.		
26.	Correlate BP with data obtained from pulse assessment and related cardiovascular signs and symptoms.		
27.	Inform client of value of and need for periodic reassessment of BP.		
28.	Record BP and report abnormal findings.		
	Note: One-step method begins with Step. 13.		
29.	Student Measurement _____ Faculty Measurement _____	**Equal within ±2**	**Not equal**

Appendix D: Permission to Use ATI Skills Module

Rikki Murff

July 10, 2019

To Whom It May Concern:

Assessment Technologies InstituteTM, LLC (ATI) has received a request from Rikki Murff to utilize the Vitals Signs skill module in a study to investigate What are the effects of multi layered simulation on the skill acquisition of obtaining blood pressure measurements for firstyear ADN students in a fundamentals of nursing course when compared to the traditional teaching method of demonstration/return demonstration?

ATI supports use of the product for this study with the following stipulations:

1. It is understood that the from School of Nursing has purchased a license to administer the ATI Vital Signs product.
2. Score data from administering ATI Vital Signs product are the property of School of Nursing.
3. Any administration of the assessments and reporting of findings must preserve the secure nature of the product intellectual property of ATI.
4. It is understood that Rikki Murff is an associate professor at University at School of Nursing with instructor-level privileges and access to data commensurate with this status. Access to and use of student scores will be in a manner which preserves the confidentiality of examinee information.
5. It is further understood that any data use is done with the permission of School of Nursing, and that the candidate has received appropriate IRB approval required by their institution and program, as well as any necessary informed consent from participating students required by their institution and program.

6. Any use of ATI-produced proprietary graphics in the reporting of study results must receive written permission from ATI. (Specific permission for ATI logos not included in this letter.)
7. The product content may not be reproduced or modified in any way.
8. ATI respectfully requests permission to review study findings relevant to its assessment products prior to publication to ensure accuracy of score interpretation.

Sincerely,

Christine Mills, PhD
Director, Research and Applied Psychometrics

[redacted]