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Nurse Educators' Perceptions of Using High-Fidelity Simulation in Teaching

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Nurse Educators' Perceptions of Using High-Fidelity Simulation in Teaching

by
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Approval Page

This applied dissertation was submitted by Marline Whigham under the direction of the persons listed below. It was submitted to the Abraham S. Fischler College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

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Statement of Original Work

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Abstract

Nurse Educators' Perceptions of Using High-Fidelity Simulation in Teaching. Marline Whigham, 2017: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: nursing education, learning strategies, simulation, staff development, teaching styles

High-fidelity simulation in nursing refers to the use of computerized manikins to offer realistic hands-on training to nursing students. The problem addressed by this dissertation was resistance among some faculty to the use of new computerized simulation technology in the nursing curriculum. The research question for this case study investigated how faculty members can incorporate simulation into the curriculum and barriers faced in setting the stage for simulation experiences for their students.

The goal of this applied dissertation study was to examine the perceptions of nurse educators regarding the benefits of and barriers to use of high-fidelity (computerized manikin) simulation with students in a university nursing program. Interviews were used in this qualitative case study to gather perceptions from educators in a university nursing program.

The study was based on the qualitative research method with a case study design. The theoretical underpinnings for the study were concentrated within a constructivist framework. Twelve nursing educators were interviewed regarding their perceptions of the use of simulation in the nursing curriculum. The findings indicated that faculty believed the use of simulation to be beneficial to nursing students by increasing patient safety, improving students' critical thinking, improving learning outcomes, and increasing competency to transfer to clinical practice. Faculty recommended further training and technical support to maximize effective use of simulation.

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Chapter 1: Introduction

Statement of the Problem

The problem addressed by this study was nurse educators' resistance to the use of computerized simulations. In nursing, use of technologically advanced, computerized manikins in high-fidelity simulation allows students the opportunity to practice skill development in a simulation before interacting with a real patient (National Council of State Boards of Nursing, 2009). Decreased availability of clinical sites for students to practice clinical skills has brought increased pressure on institutions and nurse educators to find new ways of teaching nursing students skills to improve patient outcomes in the clinical setting (Nickless, 2011). In addition, instructional technology has been incorporated in the nursing education curriculum (American Association of Colleges of Nursing [AACN], 2008, 2012; Campbell & Daley, 2013; Cato, 2011). Simulation technology has been implemented in most nursing programs to assist faculty in training student nurses in the basic skills needed for practice in a safe environment without any real danger to patients (Cato, 2011).

According to researchers for the National Advisory Council on Nurse Education and Practice (NACNEP, 2010), the incorporation of such technology-based simulation in health care programs has been a challenge for educators. Some nurse educators are challenged by the transition from traditional methods of teaching pedagogy to the integration of technology into the curriculum. Nurse educators have expressed frustration in using this new teaching pedagogy, which could affect student learning outcomes (Bradshaw & Lowenstein, 2011). A research study conducted by Feingold, Calaluce, and Kallen (2004) showed that although faculty members believed the simulated learning would transfer with the students into the clinical setting, they also commented on the

amount of extra time and resources needed to implement simulation. Adamson (2010) found a lack of time, a lack of support resources, and lack of funding for support resources presented critical barriers to use of simulation in nursing education. Regarding high-fidelity simulation, Jeffries (2008) noted, "Equipment is often purchased with the expectation that faculty will embrace the new technology, when the reality is that many faculties are not prepared for this type of teaching" (p. 70). The perceptions of nursing faculty can impact the effective use of technology within the nursing curriculum. This study was designed to determine nurse educators' perceptions of the effectiveness of high-fidelity simulation as a teaching tool as well as barriers to its use.

Literature is limited regarding educators' concerns in planning, implementing, and evaluating use of computerized manikins in the nursing curriculum. Further, the way in which nursing education is delivered to students is evolving, although educators are still responsible for producing educated, well-trained, and skilled nurses. Advances in technology uses, such as simulation, have been incorporated into nursing education; thus, leaders at educational institutions have chosen to integrate simulation as a teaching paradigm into their nursing curricula. The technique of using simulation has been recognized as an important component of a nursing program for training students in basic nursing skills and decision making (Campbell & Daley, 2013; Moule, Wilford, Sales, Haycock, & Lockyer, 2006). Florida law allows up to 50% of a nursing program's clinical training to include clinical simulation (Florida Statutes, 2016). Because of the increased usage, the National Council of State Boards of Nursing (2016) created a checklist for use of simulation in nursing programs. Therefore, nursing educators need to incorporate current technology into their curriculum in order to meet the needs of the new generation. The interactive use of simulation assists the student to acquire skills that can

be transferred into safe clinical practice (Mastrian, McGoigle, Mahan, & Bixler, 2011).

Phenomenon of Interest

Simulators. Various types of simulators are used in the field of nursing education. A low-fidelity simulator, such as a foam intramuscular injection simulator, can be used to instruct nurses in psychomotor tasks. Low-fidelity simulators appear static and lack realism (Eddington, 2011; Nehring, 2010). Moderate-fidelity simulators allow students to practice skills such as listening to breath sounds, detecting a heart murmur, and palpating pulses. They are more realistic than low-fidelity models but still lack certain characteristics; for instance, the manikin may show no chest movement while a student listens to breath sounds (Eddington, 2011). High-fidelity simulators are computerized, full-body manikins that produce the most realistic patient interaction experiences. Manikin-based simulation (a human patient simulator) is the most recent model developed by Medical Education Technologies Incorporated (METI) and SimMan (Laerdal Medical, 2013). The METI high-fidelity models are used for physiological and pharmacological purposes, allowing the simulator to act like a live patient. Responses are verbalized to enhance communication with the learner during training. Vital signs are visible from the SimMan model, and pulmonary resuscitation, intubation, and chest tube placements are just some of the procedures students are able to practice within the environment of nursing education with a high degree of realism to given scenarios (Campbell & Daley, 2013).

Benefit: Safety. Safety is a primary benefit of computerized simulations. Nursing students' clinical experiences provide the opportunity to apply the knowledge they have acquired in the classroom through theory and practice. The Institute of Medicine (IOM) report in 2004 noted that 44,000 people die each year due to medical errors, and this

number could now be even greater (Kohn, Corrigan, & Donaldson, 2010). The IOM report was highlighted by the media and scrutinized by a large number of health care stakeholders. One recommendation from the IOM report was the use of simulation by students in health care establishments and teaching institutions (Kohn et al., 2010).

Simulation has received attention as a way of enhancing nursing students' competence upon entering the clinical area and dealing with real patients' clinical experiences. Cant and Cooper (2010) noted simulation can "replicate clinical practices in a safe environment" (p. 3). Norwood (2008) stated, "Simulation with the use of human patient simulators has been proposed as one answer to patient safety" (p. 22). Isik and Kaya (2014) noted simulation is useful in practicing intravenous therapy and drug administration, skills frequently related to malpractice suits.

Benefit: Assessment. In nursing education, simulation-based experiences have been used as formative or summative assessments (Billings & Halstead, 2016; Oermann & Gaberson, 2009; Sando et al., 2013). Formative assessment can promote students' professional growth and help in developing skills and critical thinking. Likewise, summative evaluation is the "measurement of outcomes or achievement of goals" (Sando et al., 2013, p. S30). As a result, simulation supports evaluation of behavior along with assessment. Simulation helps with evaluating nursing students in the cognitive (knowledge), affective (attitude), and psychomotor (skills) domains (Sando et al., 2013).

Technological change. Simulation has become an important aspect of training nurses and helping them understand the needs of their patients. Simulation can provide opportunities for students to gain understanding by allowing them to experience and function in an environment that mirrors real situations. Students may be assisted to understand problems that might arise during their careers so they can meet these

challenges in a safe and effective manner. For this reason, medical education simulation-training strategies are viewed as effective and have been introduced to nursing faculty (Alinier, Hunt, Gordon, & Harwood, 2006; Feingold et al., 2004; Kneebone, Scott, Darzi, & Horrocks, 2004). However, despite documented research of integration of technology in nursing curricula, nursing educators often are reluctant to adopt new technologies. Dowie and Phillips (2011) conducted an informal review with 20 nurse educators and reported that although 90% used high-fidelity simulation in the curriculum, only 35% felt sufficiently prepared in its use. Nursing education has faced many challenges, but one of the greatest changes is in technological advancement.

Several factors may be related to faculty unwillingness to integrate technology into their pedagogy and classroom: (a) the lack of experience by nursing faculty using simulation in the classroom, (b) a lack of technology skills by nursing faculty to integrate advanced technology as new pedagogy, (c) the immense number of nursing faculty entering retirement due to pressure and reluctance to use technology in the curriculum, and (d) the perceptions of nursing faculty regarding the use of technology simulation in the classroom (NACNEP, 2010). Faculty complaints are lack of time, lack of proper training, and work overload. Researchers for the NACNEP (2010) examined challenges in nurse education. In order for nurse educators to stay abreast of the changes taking place in health care, they must adopt new approaches by continuous evaluation and updating their curriculum to educate a new generation of nurses (NACNEP, 2010). Educators seem to adopt technology slowly; meanwhile, the practice environment is fast paced, and practitioners must adapt quickly to implementing changes (NACNEP, 2010). DeWolf (2014) noted the importance of faculty accepting new technology, which can help to convey critical knowledge to students.

Other problems with implementation include faculty buy-in and acceptance of adding simulation to the curriculum. Eddington (2011) reported educators felt challenged by this paradigm shift in higher education; educators felt they were not fully prepared to transition from standardized clinical practice to teaching with simulation instruction. Educators may lack understanding of the many types of simulators or lack confidence in deciding which one is the best type for teaching (Eddington, 2011). Nurse educators experience apprehension and frustration in using this high-fidelity simulation teaching method and often do not have adequate training (Campbell & Daley, 2013). Further, they have complained of being overwhelmed and not having enough time to complete simulation scenarios (Campbell & Daley, 2013). In a review of literature, Anderson (2015) reported high-quality design in simulation is needed for simulation to produce a positive learning. Also, the appropriate level of fidelity of use in teaching is related to effective outcomes (Anderson, 2015). Trevizan (2012) identified the inability to use technology proficiently, deficiency in simulation knowledge, lack of time, lack of skills, and lack of support as barriers that impact educator reluctance to implement simulations.

Local study site. This study focused on how nursing educators perceive the use and potential benefits of computerized, high-fidelity simulation. The research was conducted with nurse educators employed in a college of nursing in a university in the southeastern United States. In the college of nursing that was the site for this study, once students are enrolled in the nursing program, each student participates in simulation as part of the requirement for clinical hours. Simulation rotations comprise 25% of the ongoing clinical-rotation requisites in the nursing program. State boards of nursing have approved specific substitutions and count between 10% and 25% of simulation time as clinical experience (Gaberson, Gaberson, & Oermann, 2010).

Students are expected to gain numerous psychomotor skills, which requires repeated practice. Nursing psychomotor skills include nasopharyngeal suctioning, catheter insertion, dressing changes, intravenous therapy, injections, blood pressure measurement, airway opening, endoscopy, and defibrillator use (Isik & Kaya, 2014; Salyers, 2007). Students are also expected to develop knowledge, critical thinking skills, and problem-solving skills that will enable them to make critical judgments about the care and management of patients in clinical settings (Page-Cutrara, 2014). Simulation activities are used in the nursing department to help students understand what they need to do in various nursing situations. In the simulation lab, they are able to make mistakes and learn from them without causing harm to real patients. In the past, students learned all clinical procedures by performing them on patients. The college provides students interactions through their patient simulators, which are designed to provide the knowledge, skills, and training to enter or continue growth in nursing practice.

The current study examined nurse educators' perceptions about the use of computerized simulation. The study also advances future faculty development on this topic and reveals areas in which further research is needed concerning the effective use of simulation in nursing education. A case study design was used, and face-to-face interviews were conducted with nurse educators.

Background and Justification

The baccalaureate curriculum is designed to prepare students for work in the growing and changing health care environment. Simulation education uses computerized manikins to enhance student learning and allows students the opportunity to practice skill development in a simulated environment before interacting with a real patient. Nurse educators use simulation with students in classroom and lab settings; they are then able to

assess student performances and skills as they progress into clinical areas. The National Council of State Boards of Nursing (2005) examined simulation in a nursing program and stated, "Clinical experiences might also include innovative teaching strategies that complement clinical experiences for entry into practice competency" (p. 1).

The AACN (2015) conducted a survey of 816 nursing schools in 2014 and estimated the total number of students enrolled in all nursing programs leading to a baccalaureate degree was 320,074, with 189,729 enrolled in entry-level baccalaureate programs. The IOM (2011) recommended that by 2020, 80% of registered nurses hold a Bachelor of Science in Nursing degree. In the United States, students can choose among three diverse pathways to becoming a registered nurse: the Bachelor of Science in Nursing, the Associate Degree in Nursing, and the diploma in nursing. The Bachelor of Science in Nursing is not the all-inclusive solution for all nurses, but it is relatively advanced in introducing students to a much higher range of skills and knowledge in areas such as business and health care finance, leadership, health care policy, public health, quality development, and nursing informatics (IOM, 2011).

The National League for Nursing (NLN, 2010) reported an increase in applications, admissions, and enrollments in nursing programs at all levels. The baccalaureate admission comprised 45.7% of total admission (NLN, 2010). The increase in the number of students admitted to the associate degree program in nursing was 60% more than the baccalaureate program (NLN, 2010). Nurse educators are charged to develop and utilize evidence-based learning practices to prepare graduate nurses who are capable of functioning in the complex health care environment (NLN, 2010).

The literature reflected an explosion of growth in nursing curricula, and, according to Melnyk (2008), research has shown technology can be effective in meeting a

variety of teaching and learning needs. Therefore, nurse educators use simulated experiences by preparing a simulation environment that is as realistic as possible. Simulation permits students to practice the role of a real nurse. Although traditional classroom lectures and exams are driven by grades, faculty use the simulation experience as a learning method in which students are allowed to make mistakes and learn from their mistakes without being reprimanded. Clinical simulation is a useful learning strategy that facilitates students' ability to apply and combine knowledge learned in the classroom in an environment that imitates the clinical setting (Jeffries, 2005).

Beauchesne and Douglas (2011) stated simulation in nursing has happened over time as a way to help teach students to work more effectively with patients to improve the quality of care. Simulation also has been used to provide a safe way for new nursing students to gain an understanding of how to practice as nurses and helps reduce the number of errors that occur with patients (Beauchesne & Douglas, 2011). Errors offer significant opportunities for learning, particularly when they are followed up with debriefing, because it is only through deeper reflection on the real experience that learners gain a thorough understanding of the implications of what they are doing (Dreifuerst, 2009).

The use of simulation has grown because it has been regarded as a more cost-effective way for universities to test students and provide them with realistic situations. Simulation provides the opportunity for students to practice skills before performing them on real patients, and this helps to protect patients from medical errors (Patow, 2005). The need for simulation also arises from countless issues in health care, which include innovation in medicine, increased awareness of patient safety, reduced medical errors for patients, and decrease and lack of clinical sites. Nehring (2008) emphasized,

"The major factor influencing changes in nursing education are national mandates for changes in patient safety and quality of healthcare education, technology advances, and healthcare system changes affecting clinical education" (p. 110).

Wilford and Dyle (2006) stated that the first simulators were not computer based and were not sophisticated programs like those in use today. In addition, Wilford and Dyle noted students who use simulations must "suspend reality and interact with the simulator as though it was a real patient" (p. 607) if they are to gain the most from the exercise. According to Rothgeb (2008), a high-fidelity simulator can be programmed to give a "realistic depiction of the human body in look, feel, and response to the provided care" (p. 489). As described by Adamson (2010), "High-fidelity simulators represent the latest and most advanced in simulation technology. The learner can experience realistic live scenarios. These simulators can respond in realistic ways to students' training" (p. 75). There has been some evidence, according to Lasater (2007), that students gain extra value from high-fidelity simulation, especially in the area of diagnostic skills and clinical judgment. Lasater found that practice with the simulator brought increased confidence, and the context of the classroom with peers and tutors provided enhanced support for review and reflection.

The driving forces to increase the use of simulation in nursing education are influenced by many factors. These include nurse educators' motivation to incorporate the use of simulation into their curriculum. Other factors are age, educational preparation, geographical location, and the level of the nursing program. It is not known how nurse educators perceive the learning outcome or effectiveness of simulation used within the curricula. Some researchers have reported a question of whether simulations provide other transferable skills that apply equally well in real clinical contexts (C. Murray,

Grant, Howarth, & Leigh, 2008). Therefore, the problem lies with continued reports of educators' frustration and reluctance towards adopting, using, and integrating technology into the curricula. For that reason, failure to evaluate the efficiency or usefulness of the technology (simulation) may result in a loss of valuable resources, lost opportunities to improve on the technology, and ultimate weakening of the quality of education for students.

Most of the studies on simulation in nursing education examined the issue from the point of view of learners, not from the point of view of educators and colleagues who must evaluate how well these simulations prepare students for real-life situations. Many colleges and universities are investing money in the use of simulation, and the costs should be justified through multiple studies from all perspectives. High-fidelity simulators offer a new standard for safe and effective experiential learning within baccalaureate nursing programs. The possibilities for a student learning with simulation constitute a new and inspiring field to explore.

Continued studies are needed to help identify the most productive ways to implement this new technology in nursing education. Educators must adjust teaching styles to fit this new generation of advanced technology learners. The simulators and simulation training have come a long way; however, this field is changing with technology and its use (Rosen, 2008). Lack of understanding of users' views, perceptions, and experiences adds to the intricacy of including simulation training in medical training program (Clever et al., 2011; Education Management Solutions, 2010; Rosen, 2008). Overall, agreement among faculty concerning the effectiveness of simulation technology has not resulted in reducing the uncertainty about the effectiveness of its performance or cost (Clever et al., 2011; Education Management Solutions, 2010; Rosen, 2008).

Deficiencies in the evidence. Currently, few empirical studies have determined the effectiveness of simulation training by testing whether students were able to transfer the knowledge to real-life situations. Dowie and Phillips (2011) noted, "Further research is needed to look specifically at student and facilitator support in the use of high-fidelity simulation" (p. 40). The current research explored the perceptions of nurse educators using computerized, high-fidelity simulation to train nursing students.

According to Jones, Reese, and Shelton (2014), simulation is now used in many nursing programs as a teaching pedagogy by nurse educators, but there is no organized method to help educators learn and implement the pedagogy. Jones et al. reported faculty utilizing the simulation in teaching had received different trainings, some of which were considered unreliable. Therefore, due the lack of training and unreliable information given to nurse educators, faculty training is needed in implementation of simulation into the curriculum. Further, according to Bentley and Seaback (2011), nurse educators using simulation education must understand related learning theories and simulation pedagogy. Nurse educators also should know "guidelines for simulation research, teaching and learning strategies, [and] integrating concepts into simulations and curriculum integration" (Bentley & Seaback, 2011, p. 3). However, Kardong-Edgren and Fitzgerald (2010) reported that 22 simulation evaluation tools examined clinical simulation and clinical simulation evaluation, but these evaluation tools lacked validity and reliability.

Audience

The results of this study are intended for nurse educators who are using simulation in their classrooms. The results of the study also may assist administrators who are responsible for deciding upon the use of simulation in the classroom. Qualitative case study data provide a voice to nurse educators to suggest improvements in the use of

simulation in clinical settings.

The participants were nurse educators, all with at least 1 year of experience with simulation. The participating nurse educators had opportunities to express their perceptions and share their experiences in using simulation. The study site is a baccalaureate nursing program with more than 300 nursing students. The baccalaureate curriculum is designed to prepare students for work within the growing and changing health care environment. Students practice in a simulation laboratory in a hospital-like setting utilizing several high-fidelity manikins: NOELLE Birthing Simulator, METI's Human Patient Simulator i-Stan Simulator, and a Multipurpose Pediatric Simulator. The challenge for faculty members is to integrate their use into the curriculum. Results provide insight for staff of similar nursing programs as well as researchers in the field.

Definition of Terms

The following descriptions provide the reader with a basic understanding of the terms used in this dissertation.

Case study. This term involves the study of an issue explored through one or more cases within a bounded system (Creswell, 2010). According to Yin (2009), case study methods are appropriate when the researcher's goal is to retain the holistic and significant characteristics of real-life events.

Clinical faculty. This term refers to an instructor who supervises students in a clinical setting and also uses simulation to train the student.

Educational simulation. This term refers to an online or physical experience in which learners can go through a series of steps or a series of procedures that models what they would do in a real-world situation. Simulations present students with opportunities to work with simulated patients without risk. Simulations also allow students to

understand the circumstances they may face in a real-life situation (Ma, 2011; Ward, Mukherjee, & Hai-Jew, 2012).

Fidelity. Lunce (2006) defined this term as follows: "Fidelity refers to the realism of learner interaction facilitated by the simulation as well as the type and frequency of feedback provided" (p. 38).

High-fidelity simulators. These computerized simulators, such as a manikin, are instructor driven and can demonstrate the characteristics of lifelike situations. According to Rothgeb (2008), a high-fidelity simulator can be programmed to give a "realistic depiction of the human body in look, feel and response to the provided care" (p. 489). As described by Adamson (2010), "High-fidelity simulators represent the latest and most advanced in simulation technology. The learner can experience realistic live scenarios. These simulators can respond in realistic ways to students' training" (p. 75).

Low-fidelity simulators. These simulators are foam and intramuscular and can appear static and lack realism (Eddington, 2011; Nehring, 2010).

Moderate-fidelity simulators. These simulators are more realistic than low-fidelity models but still lack certain characteristics (e.g., the manikin shows no chest movement while a student listens to breath sounds). They are instructor-driven simulators that combine part or full-body manikins with less complex computer programs (Eddington, 2011).

Qualitative research. This type of research has no theory or paradigm distinctly its own but uses many separate disciplines: narratives, content, discourse, and analysis (Denzin & Lincoln, 2011). Unlike quantitative research, which is based on statistical data, a qualitative case study design allows for the collection of verbal information to provide for an inclusive and in-depth understanding of the studied phenomena (Merriam,

2009).

Simulation. This term refers to an active learning activity normally followed by debriefing. The learning activity uses high-fidelity manikins to present realistic clinical problems that permit students to demonstrate procedures, decision making, clinical reasoning, and clinical judgment (Jefferies, 2005, 2012).

Purpose of the Study

The purpose of this qualitative case study was to describe the perceptions of invited participants who were nursing professors using computerized simulation in their curriculum via classroom and clinical training with nursing students. Simulation is widely believed to be an important aspect of many types of classroom and clinical training because it provides an opportunity for students to learn valuable skills needed for real-life situations in a safe environment. Faculty perceptions were explored regarding benefits of and barriers to use of high-fidelity, computerized simulation in the curriculum. Faculty were asked whether they feel that simulation is effective in helping students transfer knowledge and skills to respond appropriately in real clinical settings.

The sample of the study was faculty at a private university in South Florida. Participating faculty had used high-fidelity simulation for at least 1 year and were currently supervising students in the clinical setting using simulation. Findings from the present qualitative case study research add to the existing knowledge of experiences of simulation use by faculty members. In addition, the present research study examined the process of adopting new technology in simulation and barriers faced by faculty.

Chapter 2: Literature Review

This review of the literature investigates nurse educators' perceptions in the use of high-fidelity simulation in nursing education. The discussions to follow in this chapter are based on the definition of simulation training, the theoretical basis of this study, the development of simulation as a training tool, benefits of use of simulation in nursing training, barriers to use of high-fidelity simulation in nursing programs, best practices in use of simulation in nursing programs, and gaps in the literature. A review of the qualitative research approach is followed by the research questions guiding this study. The literature search included a variety of sources, such as peer-reviewed journal articles, dissertations, websites, books, reports, and presentations.

Definition of Simulation

Simulation in the area of medicine and nursing has become an important part of the education of students and practicing health care providers. According to the IOM (2010), simulation is recommended for the environment of nursing work, as it is believed to be a method to support nurses in ongoing acquisition of knowledge and skills. "Simulation," as discussed by Gaba (2004), "is a technique—not a technology—to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion" (p. i2).

Although currently there is not one universally accepted framework or theory in use for the ongoing work towards a common taxonomy or set of practices in nursing education (Aebersold & Tschannen, 2013), there is one development by Jeffries (2007). Jeffries (2007) described work features of a well-developed simulation, including clearly written objectives, fidelity that mimics real-life situations, a level of complexity, and cues

for participants as the simulation progresses and debriefing during and after the simulation is finished. Additionally, the International Nursing Association for Clinical Simulation and Learning (INACSL) published various standards of best practice for use of simulation in nursing programs (Decker et al., 2013; Franklin et al., 2013; Gloe et al., 2013; INACSL, 2011, 2013; Lioce et al., 2013; Sando et al., 2013).

Most simulations follow a similar design with prework or preparation learning by the participant before the simulation and a debriefing after the simulation (Aebersold & Tschannen, 2013). The process teaches concepts, allows risk-free practice, and provides an evaluation of critical thinking skills in nursing students (Rauen, 2004). Rauen (2004) noted,

> The emphasis in simulation is often on the application and integration of knowledge, skills, and critical thinking. Unlike a classroom setting or a paper-and-pencil test, simulation allows learners to function in an environment that is as close as possible to an actual clinical situation and provides them an opportunity to "think on their feet, not in their seat." (p. 46)

High-fidelity simulators are programmable manikins that give a realistic depiction of the human body and reaction to the provided care (Rothgeb, 2008). Such simulators allow a safe environment for students to learn from mistakes without compromising patient safety. Errors offer significant opportunities for learning, particularly when they are followed up with debriefing, because it is only through deeper reflection on the real experience that learners gain a thorough understanding of the implications of what they are doing (Dreifuerst, 2009).

Theoretical Perspective (Theoretical Lens)

According to Creswell (2013), a theoretical framework is used by a researcher to

guide the research in order to find out the known and the unknown themes within a study. Crotty (1998) explained a theoretical perspective is "the philosophical stance informing the methodology and thus providing a context for the research process and grounding its logic and criteria" (p. 3). Furthermore, in a scientific inquiry, the researcher must consider the theoretical perspective, which involves epistemological and ontological assumptions affecting observation, interpretation, and "everything else we do as researchers" (Crotty, 1998, p. 17). Crotty stated that a researcher must identify the theoretical perspectives for the research to have meaningful outcomes.

Constructivism. The theoretical underpinnings for the study were concentrated within a constructivist framework. According to Bruner (1966), constructivism is a theory founded on the active process of learning that is based on instruction. This framework describes the formulation of knowledge when an individual receives information based on experiences. Von Glaserfeld (1989) defined constructivism as a "theory of knowledge with roots in philosophy, psychology, and cybernetics" (p. 162).

Many nurse educators, along with theorists, have reported the constructivist use of clinical simulation as a teaching pedagogy to develop critical thinking in nursing students. For instance, Benner (1984) described the nursing practice as the relationship between the actual experience of health and illness of the patient to the actions of caring and giving of the nurse. Benner's theory clearly stated that the educational needs of an expert experiencing an event would be different from those of a novice entering into the same experience. Knowledge is built based on past experience. In constructivist theory, people construct understanding through experience and reflection. The use of high-fidelity simulation involves hand-on practice of skills followed by debriefing and reflection. Therefore, the constructivist theory was applicable to understanding nurse

educators' perceptions' of using simulation as a new technology.

Self-determination theory. Deci and Ryan's (1985, 2000) self-determination theory is relevant to how nurse educators recognize and implement simulation in their teaching environments and curriculum. Self-determination theory is about types of motivation to learn or act. Deci and Ryan (1985, 2000) argued that intrinsic motivation to learn can result from feelings of competence as well as constructive feedback. However, feelings of competence must be accompanied by autonomy. The use of a simulator allows nursing student to practice autonomy to gain skills without fear of harming patients through mistakes.

Further, Ryan and Deci's (2000) self-determination theory is based on internalizing information on a developmental continuum. Traditional teaching methods emphasize teaching one concept at a time, called linear thinking. In nursing education, most acute situations involve the physiology of body organ systems, and those systems do not function in isolation from one another. Rauen (2004) emphasized nursing learning "requires . . . an integrative or circular type of thinking about physiology, pathophysiology, and treatment" (p. 47).

The literature focused heavily on the theoretical basis of simulation as a teaching strategy (Jeffries, 2007; Mangold, 2007) and emphasized the need for a strong theoretical and philosophical basis for the use of any new teaching technology that validates the effectiveness of simulation as important areas for future research (Adamson, 2010). Ryan and Deci (2002) stated,

> Recognizing there is compelling evidence in favor of human tendencies toward active engagement and development and that there is, as well, manifold indication of fragmentation and conditioned responses, SDT [self-determination theory]

> provides a framework that integrates the phenomena illuminated by these discrepant viewpoints. (p. 5)

Development of Simulation-Based Training

The history of simulation stems from the military and aviation as well as nuclear power. Flight simulators are devices that artificially recreate aircraft flight and the environment for pilot training, design, or other purposes. They also replicate the equations that govern how aircraft fly; how planes react to applications of flight controls; the effects of other aircraft systems; and how the aircraft reacts to external factors such as air density, turbulence, wind shear, cloud, and precipitation (Electronic Code of Federal Regulations, 2016).

Edward Allen Link, a pioneer in aviation, underwater archaeology, and submersibles, is best known for inventing the flight simulator, which was commercialized in 1929 and referred to as the Blue Box or Link Trainer and is now a multibillion dollar industry (Clark & Eichelberger, 2012). According to Page (2000), the Link Trainer is "an efficient aeronautical training aid and a novel, profitable amusement device" (p. 3). Link formed the Link Aeronautical Corporation in 1929 to manufacture the trainers.

In 1937, according to Page (2000), simulators attracted the attention of a commercial airline when American Airlines began using the Link Trainer for pilot training. Page concluded as follows:

> With the space programs, it is well recognized that it would not have been possible for man to have set foot on the moon without the training provided by simulation, and the use of simulation to assist the problems with the Apollo 13 Mission is now legendary. International standards have now been agreed for flight simulators and a multi-million dollar simulation industry exists thanks to many

> individuals over the past seventy years who believed in simulation and especially to Edwin Link who has been called the "Father of Simulation." (p. 11)

Along the way, modern simulators were developed for risk-management needs, training for nuclear power production, the military, and a variety of other industries and professions that need to operate with low failure rates (Bradley, 2006; Gaba, 2004). Simulation programs and techniques are used in different fields for performance optimization, testing, training, education, safety engineering, and gaming. In 1994, a model in the aviation industry was developed, Line Oriented Flight Training, in which all aspects of flight were simulated and practiced (Page, 2000). In the medical field, Team Oriented Medical Simulation was developed at the University of Basel to help train professional teams to perform during critical events (Wong, 2004). The health care industry adapted technology simulators for procedural skills enhancement that did not compromise patient safety.

Development of Simulation in Nursing

Medical simulation has evolved from ivory and bone models to alabaster female likenesses to eerie wax reproductions and to plastic models of ear canals and heart chambers (Rosen, 2008). In the nursing field, a simulator was developed in the early 1900s with the Chase manikin, created by a physician's wife, Mrs. Martha Chase, who made cloth dolls for children. Lauder Sutherland, a superintendent and principal of the Hartford Hospital Training School, saw the cloth doll and requested a larger doll be made for student nurses to practice basic nursing skills. Mrs. Chase made the doll and sent it to the hospital as a training tool (Eddington, 2011; Nehring, 2010; Nickerson & Pollard, 2010).

In 1966, the first anesthesia simulator was conceived by Dr. Stephen Abrahamson

and Dr. Judson Denson and was developed so that health care workers could learn how to intubate patients and administer anesthesia (J. B. Cooper & Taqueti, 2004). The anesthesia simulator was a manikin that consisted of airway, upper torso, and arms only. Because of its high cost, further development was abandoned and its practical use was limited. In the mid-1980s, with the explosion of technology, computerized versions were developed, such as sleeper and body simulators, as well as the Anesthesia Simulator Consultant. The sleeper and body models were used for pharmacy and physiological purposes and the Anesthesia Simulator Consultant for crisis management in anesthesia. These simulators were considered too expensive for commercialization, and health care workers demonstrated a general resistance to any alternative model of training (J. B. Cooper & Taqueti, 2004).

The Harvey manikin was developed by Dr. Michael Gordon in 1968 for the training of health care professionals by mimicking human cardiovascular functions. Harvey was used to teach all levels of medical education to medical students and residents at the University of Miami. Harvey was also used by beginners in medicine to learn the techniques of blood pressure measurement, while senior-level students used Harvey to learn to recognize a heart murmur, diagnose cardiac issues, and palpate the carotid and jugular veins and arteries (M. Gordon, 1997). Harvey, which costs approximately $100,000, allowed medical professionals to practice on the teaching tool instead of on a patient volunteer. The current version of the Harvey simulator can simulate six different breath sounds, nine cardiac auscultation areas, and 12 digital impulses. In addition, its heartbeat intensity is changeable, which allows a trainee to listen to the sounds with a stethoscope, palpate the pulses, and perform electrocardiography (M. Gordon, 1997).

The first simulators were simple models of human body parts; today's models have been developed to help health care professionals learn anatomy, physiology, and the musculoskeletal system. Students are allowed to practice blood draws, start intravenous lines, and insert catheters (Bearnson & Wiker, 2005; Fraenkel & Wallen, 2003). Millions of students learned to save lives on Resusci Annie, an early manikin used for training (Rosen, 2008). However, sophisticated technology has replaced Annie. Laerdal Medical's (2013) product line includes SimMan 3G, which has the capability to simulate different medical emergencies and can teach medical personnel how to handle a stroke, heart attack, diabetic coma, vehicular collision, and many other calamities with precision in the field without hurting a patient.

Simulators for nursing and training are not new; however, use of high-technology simulators is a recent development. In nursing education, information technology is referred to as nursing informatics, which is a term related to computer science (Cato, 2011) that integrates computer science, information science, and nursing science to help nurses manage and communicate in their practices. Through participation and interaction, use of simulators provides immediate feedback to the learners and affords them the opportunity to be taught and to practice skills in the collection, analyzing, and receiving of data and information (J. A. Gordon, Wilkerson, Shaffer, & Armstrong, 2001). Various types of simulators can be utilized in the field of nursing, and students can be taught using a variety of simulators, such as the following:

1. Low-fidelity simulators, such as a foam intramuscular injection simulator, can be used to instruct nurses in psychomotor tasks. They appear static and lack realism (Eddington, 2011; Nehring, 2010).

2. Moderate-fidelity simulators allow students to practice skills such as listening

to breath sounds, detecting a heart murmur, and palpating pulses. They are more realistic than low-fidelity models but still lack certain characteristics; for instance, the model shows no chest movement while a student listens to breath sounds (Eddington, 2011).

3. High-fidelity simulators are computerized, full-body manikins that produce the most realistic patient-interaction experiences. They are instructor driven and can demonstrate the characteristics of lifelike situations (Nehring, 2010).

4. Part-task and procedural trainers replicate a part of the body or environment and teach basic psychomotor skills. They have arms for drawing blood or inserting catheters intravenously and intubation. This tool is inexpensive and is utilized by all nursing schools (Nehring, 2010).

5. Complex-task trainers are useful in clinical environments; however, the procedures are not visible to the instructor (i.e., during a pelvic exam, it is difficult for the instructor to see if the procedure is being performed correctly). Therefore, sensors are applied to provide feedback to the student. This simulation is expensive (Nehring, 2010).

6. Screen-based computer simulators, the most complex of all, present the organs on a two-dimensional computer screen and are used for minimally invasive surgeries (Benner, Hooper-Kyriakidis, & Stannard, 1999; Nehring, 2010; Tan & Payton, 2011). The practices offer opportunities to practice surgical skills procedures, such as central line insertions via computer-based training (Galloway, 2009).

7. Manikin-based simulation (human patient simulator) is the most recent model developed by METI and SimMan (Laerdal Medical, 2013). The simulators are computerized whole-body manikins of all ages (infant, child, and adult). The METI high-fidelity models are used for physiological and pharmacological purposes, allowing the simulator to act like a live patient. Responses are verbalized to enhance communication

with the learner during training. Vital signs are visible from the SimMan model, and pulmonary resuscitation, intubation, and chest tube placements are just some of the procedures students are able to practice within the environment of nursing education and contribute to very high degrees of realism to given scenarios (Campbell & Daley, 2013).

Benefits to Use of Simulation in Nursing Training

Simulation has demonstrated effectiveness in training practicing nurses for new procedures, communication processes, skills, and techniques (Aebersold & Tschannen, 2013). High-fidelity simulation provides a suitable methodology for deliberately performing skills necessary to be an effective nurse. Benefits include improved knowledge and psychomotor skills, a learning environment safe for both students and patients, student motivation and confidence, transfer of knowledge to work with real patients, and caring behaviors and practices.

Knowledge and skills. According to McNeal (2010), the importance of simulation lies in the opportunity for students to understand how to handle materials, how to safely handle chemicals, and how to attain certain skill levels prior to actual high-frequency or high-acuity situations. He further asserted that because of the shortages of nurses in many hospitals, the need for simulation in nursing has increased.

Simulation, according to Lunce (2006), motivates learners to work on their problem-solving skills, test hypotheses, gain experience in learning processes, construct schemas, and develop mental models they can manipulate in actual practice. Ladd, Grimley, Hickman, Elazouri, and Shaikh (2008) and Touhy (2013) stated that simulations are used to help students understand what to do in real-life situations. Simulation allows learners to engage in repetitive practice. Proper use could reduce greatly the number of medical errors (L. H. Green, 2014).

Elfrink, Kirkpatrick, Nininger, and Schubert (2010) directed an exploratory study that entailed the evaluation of human patient simulation and cognitive learning outcomes. Nursing students were tested before and after the simulation experience. The results suggested simulation-related content significantly improved the students' knowledge in the care of patients who had a mastectomy. Even though the results had mixed findings in the retention of content, the conjecture was that the simulation training had a beneficial impact on the students' ability to care for their patients.

O'Boyle-Duggan (2010) discussed the efficacy of simulation training with nursing students to prepare them to work with patients with challenging behaviors or learning disabilities. Students at Birmingham City University in a specific unit were given challenging scenarios with care plans and other information. The students, after being paired, were given 10 minutes to decipher a plan and to implement intervention strategies. The students then reflected on their positive and negative experiences after those 10 minutes had elapsed. Their sessions were also videotaped. The themes that emerged were an increase in confidence, more opportunity to practice in a safer environment, discussion of best practices, and increased competency in the use of skills and theory to deal with patients exhibiting challenging behaviors (O'Boyle-Duggan, 2010).

Dunbar-Reid, Sinclair, and Hudson (2011) evaluated a program using high-fidelity simulation to train staff members who performed hemodialysis in a dialysis unit in Australia. The assessment disclosed confidence gained by staff while managing several clinical situations in the care of the dialysis patients. The result suggested that simulation training assists in education, proactive learning, interprofessional learning, and preparation modification in patient care.

Jeffries et al. (2011) implemented and evaluated outcomes of cardiovascular assessments in the curriculum of advanced practice nurses at four institutions. The educational intervention contained case presentations in which the Harvey Cardiopulmonary Patient Simulator was utilized. A self-directed education class was also involved using the Harvey Cardiopulmonary Patient Simulator along with a multimedia, computer-based CD-ROM program. Thirty-six participants were students who used simulation training. The result showed a significant pre- to posttest increase in student cognitive knowledge and cardiovascular assessment skills. The curriculum was based on deliberate practice in providing positive teaching strategy as shown by previous studies with resident and medical students.

According to Rutherford-Hemming (2012), the learners' goals, expectations, and experiences impact how the learners gain knowledge with simulation experience, based on cognitive learning theory. Rutherford-Hemming declared, "In the simulation instruction model, the instructors facilitate the learning environment within a cognitive construct" (p. 131).

Ciak and Lewis (2011) conducted a simulation in a nursing education program course focused with pediatrics and obstetrics scenarios in a diploma school of nursing to investigate the use of high-fidelity simulation as a learning strategy over four semesters. Students reported positive outcomes ($N = 63$). The areas of improvement reported were self-confidence, increased satisfaction, and cognitive learning. Bricker and Pardee (2011) reported similar findings when simulation was utilized in a rehabilitation scenario involving undergraduate nursing students.

Isik and Kaya (2014) found that students using simulation technology were more successful at psychomotor tasks, needed less help, and performed better than students

instructed traditionally. Results suggested that simulation was effective for teaching nursing psychomotor skills and reduced anxiety levels among students. Isik and Kaya noted the importance of using simulation in high-risk skills such as intravenous therapy and drug administration.

Safety. Simulation allows nursing students to practice skills without posing risks to actual patients (Gaba, 2004). In hospital settings, simulations allow for decreased risks of harming patients, decreased turnover of faculty, justification of more simulation centers regardless of costs, and nurses feeling better trained to do their jobs (McIntosh, Macario, Flanagan, & Gaba, 2006). Cant and Cooper (2010) noted simulation can "replicate clinical practices in a safe environment" (p. 3). High-fidelity simulators contribute to patient safety (Miller, Leadingham, & Vance, 2010; Norwood, 2008).

Emergency room care is an area of high ambiguity, rapid change, a wide range of potential clinical issues, and the need for quick decision making and close teamwork. Satish and Streufert (2002) recommended simulations for both individuals and teams in this context because of their design to train competent, confident, decision making in a fast-paced and highly detailed environment. However, in the clinical setting, teachers often do not have control over the types of experiences a learner will have or the conditions under which skills can be observed, learned, or practiced. According to Rauen (2004),

> A new critical care nurse could potentially complete an entire orientation period and not experience a common or high-acuity event that the nurse must be competent to deal with in order to practice safely in an intensive care unit. In contrast with the real clinical setting, simulated clinical situations involve only a few safety concerns and allow instructors and preceptors to completely control the

events. (p. 48)

C. J. Gordon and Buckley (2009) conducted a study with 38 registered nurses. The study focused on the effectiveness of high-fidelity simulation of medical-surgical nurses' self-reported ability to recognize and quickly respond to any type of emergency. The results of the study showed improved ability to respond to any emergency after receiving simulation training.

Simulation is a safe way for nursing students to gain an understanding of how to practice as nurses and helps reduce the number of errors that occur with actual patients (Beauchesne & Douglas, 2011). Errors offer significant opportunities for learning, particularly when they are followed up with debriefing, because it is only through deeper reflection on the real experience that learners gain a thorough understanding of the implications of what they are doing (Dreifuerst, 2009). Simulations allow a no-risk, low-anxiety environment for students to learn from their mistakes (Dreifuerst, 2009; Isik & Kaya, 2014; Miller et al., 2010). Miller et al. (2010) stated, "Students have the opportunity to exercise clinical decision making, even make mistakes, and then benefit from immediate feedback from faculty in a safe environment" (p. 38).

Aebersold and Tschannen (2013) concluded from a meta-analysis that simulation can effectively improve nurses' competency in a given area. Similarly, simulation can be used as an evaluation method to ensure annual competencies or remediation of poor performance from employees (Aebersold & Tschannen, 2013).

Student confidence and motivation. Miller et al. (2010) piloted a descriptive study on the evaluation of nursing students' perceptions using human patient simulators as an instructional tool within the curriculum of an associate degree nursing program. Throughout Miller et al.'s study, faculty members were present, and they gave cues about

the phases involved in learning each skill that took place at the end of simulation training. After the simulation, debriefing allowed students to work through any emotional reactions to mistakes and receive support from faculty. Students surveyed reported satisfaction using simulation as a learning tool. Miller et al. explained that because of the use of a small sample ($N = 43$), more research was needed to replicate the findings. Students gained confidence in Miller et al.'s study by having the opportunity to make decisions and even mistakes in a safe environment. Isik and Kaya (2014) reported simulation reduced anxiety among nursing students, which led to increased competence.

Similarly, Christian and Krumwiede (2013), in a study on the use of simulation to train for the management of preeclampsia and eclampsia, found obstetric nurses' overall self-efficacy when managing those conditions significantly improved with high-fidelity simulation training. Christian and Krumwiede concluded, "Other high-risk, low-incidence obstetric emergencies may also be suitable topics for simulation training" (p. e369).

In one study conducted by Beyea, Slattery, and von Reyn (2010), simulation experience was used in a nursing residency program involving 260 participants. All the student nurses were exposed to simulation in the clinical setting. After the training, debriefing was completed in which orientation, productivity, recruitment, and turnover were assessed. Beyea et al. later evaluated the performance and found those students' orientation time decreased and their productivity time increased. Likewise, recruitment increased while turnover decreased.

Transfer of knowledge. According to Mastrian et al. (2011), information technology is now a vital part of nursing clinical practice that continues to change and have a lasting impact on nursing education. The goal of high-fidelity simulation is to

assist students in developing skills that will transfer to their clinical practice. Mastrian et al. also said, "Technology as a teaching and learning tool is essential to build transferable knowledge for clinical application" (p. 22).

In using the traditional classroom lecturer, the student can memorize, do return demonstration, and master technical skills; nevertheless, in order to master the clinical concept of critical thinking, transfer of knowledge can be best accomplished by empirical learning. Lisko and O'Dell (2010) studied nursing students and the use of moderate- to high-fidelity manikins in a controlled environment. Lisko and O'Dell reported that knowledge gained from using simulations was retained longer in students than knowledge gained from lectures in the classroom. Relating these findings to constructivist theory, the active process of learning leads to construction of knowledge (Bruner, 1966).

The challenge facing educators is to bridge the gap between using simulation in learning laboratories and transferring that knowledge as it is applied to actual clinical practice (Beauchesne & Douglas, 2011). Beauchesne and Douglas (2011) further claimed that in an effort to increase student learning, simulation could be used in conjunction with direct clinical experiences in order to offer students the opportunity to learn in a unique way.

Teaching caring behaviors. In addition to teaching cognitive and psychomotor skills, simulation can teach nursing students affective skills and attitudes (Lioce et al., 2013). Eggenberger, Keller, Chase, and Payne (2012) conducted a study based on the caring theory in nursing education in which faculty observed nursing students to investigate whether learning actually occurred in the area of interpersonal relationships between the nursing student and the patient. Eggenberger et al. argued that when the

nursing student showed empathy to what the patient was feeling, caring ensued. Discussions continue on the meaning of caring in nursing, ways to measure caring, and how to evaluate its relational practice (Eggenberger et al., 2012). Adding caring-based scenarios to a simulated experience for the nursing student should increase in nursing education. Practical and psychomotor skills are taught in aviation as well as the health domain; however, people skills are not taught sufficiently to make the difference in nursing care, according to Eggenberger et al. Team-based games can build complex simulations that are designed to elicit people skills as well as technical capabilities (Aldrich, 2005).

Blum, Borglund, and Parcells (2010) examined the effectiveness in teaching caring behavior to nursing students with the use of high-fidelity simulated patient interactions. The study involved preintervention and postintervention surveys to identify the students' abilities to self-recognize caring behaviors. Blum et al. concluded that simulation training led to a significant increase in the student's ability to recognize the caring behavior. This recognition led to a consensus definition of caring behaviors. Additionally, simulation allowed for reflective activities and modeling opportunities in the area of interpersonal relationships between the nursing student and the patient.

People's behaviors, attitudes, and limits commonly can be traced back to their experiences as children in school (Gardner, 1983). Depending upon the frame of reference of each person, those experiences could have left a positive or negative impact on the learner. People of all ages want to learn about what they are naturally good at, preferring to excel rather than be bombarded and disillusioned by experiences that have no meaning (Gardner, 1983). Mastrian et al. (2011) stated, "It is believed that the Net Generation thinks and processes information differently from previous generations" (p.

34). Mastrian et al. further explained the change is due to a phenomenon called "brain plasticity . . . the brain's capacity to reorganize its structure and function based on experiences over a lifetime" (p. 34), changing how the Net Generation has become skilled at using technology. Mastrian et al.'s explanations hearken back to the theoretical basis of this study, constructivism.

The benefits of high-fidelity simulation can be impacted by other factors, however. Beischel (2013) conducted a study with nursing students using high-fidelity simulation and found anxiety and cognitive learning outcomes could be affected when the learners did not receive adequate amounts of sleep or nutrition. Further, even the best or strongest learner can experience test anxiety. Beischel concluded that lack of adequate sleep can lead to poor decision making, a lack of flexible and innovative thought, an inability to focus attention on essential information, and helplessness to change strategies when the unexpected occurs. Further, nutrition affects cognition, memory, and mood (Benton, Slater, & Donohoe, 2001; Smith, Clark, & Gallagher, 1999). Not eating breakfast can lead to lethargy, unpleasantness, and irritability, especially when beginning the process of taking tests (Smith et al., 1999). Test anxiety influences cognitive learning as well and is affected negatively when the performance is tested or critiqued (Beischel, 2013).

Barriers to Use of High-Fidelity Simulation

Costs. The estimated cost of implementing a high-fidelity simulation lab is another barrier many universities face. The cost can average at $1 million, with a minimum of $15,000 annually for maintenance upkeep (Laerdal Medical, 2013). The cost to implement an effective simulation center for nurse training may range $750,000 to $1 million (Laerdal Medical, 2013; Nehring, 2010).

Related to cost are reported barriers of lack of support, time, training, space, equipment, funding, and staffing (Adamson, 2010; Jansen, Johnson, Larson, Berry, & Brenner, 2009). Although simulation centers worldwide have increased since 1994, barriers that could impede the progression of commitment and learning must be prioritized and considered for the cost of related training (Touriniemi & Schott-Baer, 2008).

The high-fidelity human-patient simulator has been favored tremendously since 2000, according to Jeffries (2008); however, the underutilization of this innovative equipment has been minimally studied. Billings and Halstead (2016) analyzed literature to strategize the integration of high-fidelity simulation effectively into the nursing education curriculum, highlighting facilitators and barriers to curricular change. The literature has not addressed the experiences of nursing faculty or perception of barriers and facilitators to the integration of high-fidelity simulation (Billings & Halstead, 2016). In short, many organizations have obligated funds for adopting high-fidelity human-patient simulation equipment, but very few have invested in suitable resources, time, or funds for educating personnel on how to use the equipment or network optimally with other organizations for the continued longevity of its use (Adamson, 2010). This lack of resources and support for personnel leads to faculty barriers in simulation use.

Faculty barriers. Adamson (2010) further examined the integration of high-fidelity simulation in nursing education as it related to the faculty-reported barriers, facilitators, and recommended incentives for improving its use. Adamson reviewed and assessed all the data for common threads or patterns and used an online survey to determine responses to several questions. Adamson's findings clearly indicated a lack of time, a lack of support resources, and lack of funding for support resources presented

critical hindrances to use of simulation through maintenance, training, and support.

Alexander et al. (2015) reported a study comparing students utilizing simulation experiences to those in a traditional clinical opportunity; simulation experiences with various levels of fidelity were conducted, and there were no statistically significant differences in clinical competency as assessed. However, this finding did not imply that simulation is universally equivalent to a traditional clinical experience. Alexander et al. concluded a barrier or possible negative outcome is faculty not being trained or having no experience with simulation and thereby not obtaining an effective outcome in the use of simulation. Alexander et al. recommended with high priority that education programs using simulation offer continuous monitoring and have some form of related infrastructure, including added resources and adequately trained faculty.

Wolf et al. (2011) suggested that one barrier to simulation is nurse educator evaluation. The caring nature of nurse educators may soften the evaluation. When a student fails to perform satisfactorily, the nurse educator may wish to give the "benefit of the doubt" (Wolf et al., 2011, p. 132). Another barrier, according to Wolf et al., is the faculty choice in simulator model.

Irwin (2011) reported that although the use of simulation is not new, the concept of this sophisticated technology is a new idea in teaching and is multifaceted. Institutional leaders must address faculty unease with implementation due to the complexity and high cost. Irwin warned that educators simply may be afraid of the unknown.

To overcome barriers to integrating new technology into teaching practice, nurse educators must view it as a vehicle to improve learner outcomes (Lawrence & Lentle-Keenan, 2013). Gore and Thompson (2016) noted that simulation is used as experiential learning in nursing education. It should not be looked upon as mere technology but as

bridging a gap in the didactic lesson and clinical skills. Further, for simulation to be effective, the student must be debriefed after simulation to ensure learning outcomes (Gore & Thompson, 2016). Therefore, the effectiveness of teaching and learning affects the social aspect of the student leaning outcome. Social learning theorists such as Bandura (1977) and Vygotsky (1978) contended that social influences have an impact on learning. According to Paquette (2012), "Role play simulation is a form of experiential learning that allows you to 'cover' the same sort of topics as you would in a lecture course while moving your students from passive to active learners" (para. 1).

Billings and Halstead (2016) stated, "The purpose of integrating simulation into any curriculum is to provide students with beneficial learning experience that will assist in meeting course and program objectives while promoting safe patient care" (p. 321). In addition, the use of high-fidelity simulation gives student the opportunity to reach the highest level in skill and performance, helping them to prioritize care and develop critical thinking (Billings & Halstead, 2016).

Mastrian et al. (2011) described great need for professionals presently practicing along with nursing faculty to accept changes related to the continued growth and advancement of technologies. Mastrian et al. explained, "We cannot hope to train our students on every possible technology, [but] we can help them develop transferable skills and appropriate attitudes toward technology that will serve them well for years to come" (p. 22).

Campbell and Daley (2013) argued that nurse educators continue to show signs of frustration and anxiety in the use of high-fidelity simulation. They are not satisfied with the training they receive and are not sure where and how to begin with these types of simulators. They struggle with the inclusion of technology within the area of nursing

education and are also frustrated by the shortage of nursing staff and clinical sites. Thus, they are discouraged by any added workload within the nursing curriculum. Barriers to the inclusion of high-fidelity simulation in nursing education continue based on expenditures and high financial costs, faculty development, ongoing faculty training, administrative support, and technical maintenance.

Dowie and Phillips (2011) found that, although faculty believed high-fidelity simulation to be beneficial to learning, faculty also lacked confidence in its use. In an informal questionnaire study with 20 faculty members, 90% reported using high-fidelity simulators; however, only 35% felt sufficiently prepared for its use and 40% felt confident.

In a qualitative study, Quilici et al. (2015) found that faculty considered simulation an excellent teaching tool; barriers, however, were the high levels of preparation and planning needed. Faculty also noted the need for clearly stated objectives (Quilici et al., 2015). Clearly stated objectives are among the standards developed by the INACSL (Lioce et al., 2013). The next section discusses best practices and standards in simulation use.

Best Practices in Simulation Use in Nursing Programs

Miller et al. (2010) observed a need for more research on best practices in the use of simulation in nursing education. Adamson (2010), Beischel (2013), Eggenberger (2015), Felicilda-Reynaldo and Utley (2015), and L. H. Green (2014) reported that the goal of simulation training is to integrate training for the sole purposes of student knowledge, skills, and abilities. Personnel in health care industries can be more accepting of the use of technology and the necessity for simulation to play a significant role in solving health care challenges and to be accepted as a standard tool for its delivery to

institutions.

Although the full potential of health care has yet to unfold, be explored, and be demonstrated, Barjis (2011) classified health care simulation models into three groups of potential: (a) models of the human body, frequently called disease models, including biological processes in healthy individuals; (b) models for tactical purposes at the health care unit level (clinic, ward, department, hospital); and (c) models for strategic purposes comprising system-wide models that often do not model individual patients at all. Health care simulation can be extended beyond the traditional role of comparing scenarios or visualizing workflows. According to Darema (2004), the use of a simulation model can be incorporated into the program and be used in an effective way to monitor and help improve student performance by providing an ongoing system of training within the organization.

With advancement in technology, some nursing school curriculum directors have revolutionized teaching formats and instruction in clinical settings by including different types of simulators that allow nursing students to practice psychomotor skills and gain knowledge (Axley, 2008; Decker, Sportsman, Puetz, & Billings, 2008). The IOM (2010) stated the future of nursing lies in encouraging nursing educators to use technology, such as high-fidelity simulators, as an important component of nursing education. In the study conducted by Beauchesne and Douglas (2011), nurse educators played an integral part in scenario preparation and implementation of simulation practices for nursing students. In three distinct roles, faculty observed the scenario, served as the expert registered nurse, or served as simulator programmer. Faculty understanding of their roles and best practices in the simulation experience leads to improved outcomes.

Provide individualized, diverse learning experiences. An advantage of

simulation relates to the best practice of individualized and diverse learning. Miller et al. (2010) pointed out, "Simulation incorporated a variety of learning styles (visual, auditory, tactile, and kinesthetic) into a single, highly active, technology-rich learning activity" (p. 37). Use of simulation permits individualized learning according to the needs of each student (McGaghie, Issenberg, Petrusa, & Scalese, 2010). Bradshaw and Lowenstein (2011) reported no single instructional method is completely effective in a culturally diverse classroom. Therefore, educators should find a wide range of ways to incorporate instructional and assessment pedagogies into the curricula to meet the learning styles of a culturally diverse population of students. The AACN (2015) noted the increasingly diverse backgrounds of nursing students as enrollment increases; in 2014, the percentage of students from underrepresented backgrounds in entry-level baccalaureate nursing programs increased to 30%.

Neuman et al. (2009) urged a shift in the paradigm used in nursing education. Due to these paradigm shifts, such as new technologies, nursing education should involve models that recognize students with various learning styles and that will have an effect on how they learn and retain the knowledge acquired (Neuman et al., 2009). Eddington (2011) noted nursing practices have changed, creating more demands on nurse educators to utilize new pedagogy and teaching tools.

With increased sophistication of the available tools used in simulation, a wide range of difficulties and various types of exercises can be manipulated to challenge the nursing student's skills for best practices. The educator's approach is crucial to the success or failure of the exercises, because many situations require a more complex mix of technique in communication skills, which are best practiced in scenarios where individuals take up defined roles and work in teams (Nikendei et al., 2005). An

overemphasis regarding properties of the simulation tool and its ever-improving fidelity to real-life situations often leads to educators wanting to teach more advanced skills in simulations, rather than exploiting its potential for thorough training of basic skills, recap, and practice of skills already learned months and years earlier (Salas, Bowers, & Rhodenizer, 2009).

Use researcher-identified steps and domains. Gaba (2004) maintained that high-fidelity simulation can be integrated in health care training through support from research, professional societies and schools, funders, insurers, and accrediting organizations. Gaba described several steps to assist nurses in understanding the potential use of simulation. Gaba identified 11 domains in use of simulation in health care:

1. The aims and purposes are to educate, train, and assess competency, with an emphasis on training and practice.

2. The unit of participation can be the individual, but simulations should be used to help train for teamwork.

3. Educators should consider the experience level of participants.

4. The specific health care domain must be considered. Simulation is particularly useful in high-risk domains where safe opportunities to practice are important.

5. The professional discipline of participants is relevant, with simulation particularly important for use in training health care technicians, nurses, and physicians.

6. The type of knowledge, skill, attitudes, or behaviors addressed in simulation should be considered. Simulation can teach not only technical skills, but also decision making, attitudes, and teamwork.

7. The patient age can be varied in simulations.

8. Technology applicable can range from part-task trainers to high-fidelity

electronic patients, the most effective use of simulation.

9.The site of simulation participation is most effective in a replica of the clinical environment.

10. The extent of direct participation is important, with direct on-site hands-on participation leading to the best learning.

11. Feedback methods include automatic critique by the simulator, instructor critique of simulation sessions, real-time critiques, and debriefing.

In a similar effort at identifying best practices, Aebersold and Tschannen (2013) identified five steps to overall simulation success. These phases were (a) key concept identification, (b) competency and standard mapping, (c) scenario building, (d) debriefing development, and (e) beta testing and refinement of the scenario. Aebersold and Tschannen further explained how important it is for each step to be followed in order to be successful in using simulation.

Each simulation is presented in three parts: (a) preparation, (b) the simulated scenario, and (c) debriefing (Campbell & Daley, 2013; Elsevier, 2011). During preparation, educators present detailed outlines to help guide students through the simulation experience. Initiating the scenario requires the instructor to present the scenario with clear instructions (Campbell & Daley, 2013; Elsevier, 2011). Normally, simulations are to be conducted without interruption; however, Fanning and Gaba (2007) determined that occasional interruptions and debriefings were necessary when the patient's safety was at risk. Finally, in the most important step in the simulation experience, debriefing allows students to reflect on their perceptions and experiences of simulation while educators analyze students' performances and provide feedback and both students and educators collaborate and communicate with each other (Campbell &

Daley, 2013; Elsevier, 2011). After discussion, nurse educators identify areas that are needed for further review and direct students toward resources based on their individual needs so they can improve (Campbell & Daley, 2013; Elsevier, 2011).

Begin with clear objectives. The INACSL included participant objectives as a best practice standard (Lioce et al., 2013). Any simulation experience should begin with clearly written objectives that correspond to the learners' knowledge and experience (Franklin et al., 2003; Lioce et al., 2013). Objectives can be related to cognitive, affective, and psychomotor skills and should be aligned with program outcomes.

Teach critical thinking. The NLN (2003) issued a statement that nurse educators must "create learning environments that facilitate student's critical thinking, self-reflection, and prepare graduates for practice in a complex, dynamic health care environment" (pp. 1-2). Levett-Jones, Lapkin, Hoffman, Arthur, and Roche (2011) argued how the failure-to-rescue use in a scenario refers to the failure to identify deteriorating patients and respond in a suitable way, which can be related to poor clinical reasoning skills. Levett-Jones et al. identified several factors that could affect effective clinical reasoning, such as the nurse's ability to distinguish clinical reasoning; the ability to identify issues and be able to prioritize patient care; the ability to identify the patient's needs; the ability to use the right action based on judgment; and the ability to make a decision based on ethical, legal, and professional concerns. Simulated scenarios can allow individuals and teams to learn and practice critical thinking and responses in a safe environment (Miller et al., 2010).

Provide debriefing. Already described briefly as a critical part of researcher-identified steps in simulation processes, debriefing is vital to transfer of knowledge. Decker et al. (2013) stated, "Research provides evidence that the debriefing process is the

most important component of a simulation-based learning experience" (p. S27). Errors followed by debriefing lead to learning, because only through deeper reflection on the real experience do learners gain a thorough understanding of the implications of what they are doing (Dreifuerst, 2009). Debriefing is a critical part of the simulation process (Aebersold & Tschannen, 2013; Campbell & Daley, 2013; Decker et al., 2013; Elsevier, 2011; Franklin et al., 2013; Gaba, 2004; Jeffries, 2007; Miller et al., 2010).

Reflection requires guidance by the nurse educator (Decker et al., 2013). A skilled nursing educator can focus reflection on mistakes to lead to learning rather than anxiety (Decker et al., 2013). The educator must be able to provide a safe learning environment of trust, open communication, respect, and confidentiality (Decker et al., 2013). The length of the debriefing can vary based on the experience.

Maintain professional integrity. Maintaining integrity in the simulation learning experience includes professionalism, respect, and confidentiality (Gloe et al., 2013). Lack of professionalism can negatively impact student motivation and participation and undermine the entire experience. Professionalism includes providing constructive feedback, demonstrating and teaching ethnical behavior (Gloe et al., 2013).

Facilitate the learning experience. Additional best practices relate to the educators' role as a facilitator. With advancement in technology, some nursing school curriculum directors have revolutionized teaching formats and clinical settings instruction by including different types of simulators that allow nursing students to practice psychomotor skills and gain knowledge (Axley, 2008; Decker et al., 2008). The IOM (2010) stated the future of nursing lies in encouraging nursing educators to use technology, such as high-fidelity simulators as an important component of nursing education. In the study conducted by Beauchesne and Douglas (2011), nurse educators

played an integral part in scenario preparation and implementation of simulation practices for nursing students. In three distinct roles, faculty observed the scenario, served as the expert registered nurse, or served as simulator programmer.

To facilitate learning, the nurse educator must be proficient with the use of complex equipment and scenarios (Boese et al., 2013). The educator must have knowledge of "simulation as a pedagogy" (Franklin et al., 2013, p. S23). Facilitation includes understanding diverse cultural and individual experiences of participants (Franklin et al., 2013). Facilitators should incorporate these diverse needs and experiences into the planning and implementation of the simulation and provide debriefing, as already outlined (Franklin et al., 2013).

Provide mentoring. Nursing educators play a vital role in guiding and helping student nurses learn competency skills, acquire knowledge, and perfect psychomotor skills for a safe, professional practice (Hsu, 2006; Tanner, 2010). Today's students study in a digital culture and learn through innovative approaches with integrated technology (Jeffries, 2005). Other challenges in nurse training and nursing education are shortage of clinical nurses, reduced acute care, reduction of admission days, and faculty shortages. Nursing students also face an ongoing, fast-paced, and short staff environment starting from the beginning of nursing school. Nurse educators must become mentors because their ultimate goal is to retain the student while providing optimal learning experiences. Nurse educators act as mentors to provide guidance, support, and role models for nursing students in clinical settings (Mead, Hopkins, & Wilson, 2011).

The major component of mentoring is to provide personal help to students so they become competent and well prepared to practice safely in clinical settings. However, according to Duffy (2003), mentors often pass failing students whose competence is in

question. He offered evidence suggesting that some mentors lack the confidence to guide students in practice settings. Nursing school administrators could explore further effective and safe practices of mentoring in nursing education. M. T. Green and Puetzer (2002) identified a need to implement and develop the relationship between new and experienced nurses.

Leonard, Shuhaibar, and Chen (2010) explained that mentoring starts when the nurse educator prepares nurses with simple understanding of patient care delivery. Nurse educators may not be fully prepared for a mentorship role, however. Peters and Boylston (2006) identified three areas where support should be given to help nurse educators transition into the role of mentors: (a) orientation to the nursing program and facility; (b) instruction on how to develop a syllabus, prepare a lecture, oversee clinical orientation, and grade students; and (c) how to work with challenging students who require extra attention. Schools must invest time and money to support educational and professional growth of nurse educators. As pointed out by Decker et al. (2013), the debriefing process of simulation requires a skilled nurse educator. Further, to facilitate learning, the nurse educator must be proficient with the use of complex equipment and scenarios (Boese et al., 2013). Training is necessary to prepare nurse educators as effective mentors and simulation facilitators.

Understand andragogy. Nurse educators and their students must agree cognitively and emotionally that each is an adult, and the pivotal educational approach is that adults learn differently than children (Knowles, 1975; Merriam, 2001). Knowles (1980) conceptualized andragogy as the art and science of adult learning. Adults learn differently than children, and the assumptions of andragogy lie in experience, motivation, and interpretation (Tobias, 1994).

Knowles (1980, 1990) suggested five assumptions that apply to adult learning, based on maturity as the key factor in the adult's learning experiences. Knowles's (1980, 1990) five assumptions are (a) self-concept of the learner as he or she moves from dependence to independence and self-direction, (b) learner experience, (c) readiness to learn and accept the developmental tasks of social roles, (d) orientation to learning centered on immediacy and problem solving, and (e) motivation. Adults need to be involved in the planning and evaluation of their instruction, experience provides the basis for learning activities, the interest of learning has to be relevant and impactful, and the learning should be problem centered and not content oriented (Knowles, 1980, 1990).

Use evidence-based practice and engage in lifelong learning. Evidence-based practice is a concept initially popularized in the medical profession by Cochrane (1972) in his assertion of the importance of using reliable evidence from randomized control trials to guide medical practice. The IOM integrated the idea of evidence-based practice, now identified as a core competency, for the scope and standards of nursing practice (American Nurses Association, 2010).

Evidence-based practice is a part of teaching philosophy. Felicilda-Reynaldo and Utley (2015), focusing on the nature and importance of evidence-based practice in teaching philosophy statements, found that academic nurse educators were allowed to reflect on their teaching practices and validate their success in teaching. According to Polit and Beck (2010), the basic features of evidence-based practice involve problem solving and making clinical decisions using the best current evidence. Moreover, elements of a teaching philosophy statement may include the educator's values, beliefs, and actions in the educational process as well as the nature and roles of student–faculty interactions during the learning-and-teaching process (Felicilda-Reynaldo & Utley,

2015). Kearns and Sullivan (2011) perceived that teaching philosophies also may allow the following: (a) a description of teaching methods, (b) an explanation of why the methods are used, (c) evaluation of the effectiveness of the pedagogy, and (d) a plan for modifications needed for future teaching activities.

Christ (2003) mentioned that written philosophy statements are supported by a public accounting of the educator's active engagement in the scholarship of teaching and learning. Felicilda-Reynaldo and Utley (2015) deployed an online survey through Zoomerang from October 2011 to March 2012, and 456 academic nurse educators from 33 states participated in the survey. Of the 456 participants who completed the survey, only 375 shared their teaching philosophies, resulting in 41% who mentioned critical thinking and reflection in their analyzed statements. For evidence-based practice to be incorporated into clinical practice, Felicilda-Reynaldo and Utley explained, "Nurses must have cognitive maturity and a professional commitment to searching for the best way to provide the best care, given the best evidence" (p. 91).

Even so, according to Felicilda-Reynaldo and Utley (2015), medicine is constantly changing; one educator in their study cited lifelong learning as imperative, including learning new technologies in nursing. Kedge and Appleby (2009) stated that lifelong learning requires the nurse to be openly curious about new trends in practice and to show a willingness to self-educate. Therefore, learning is a necessary practice and an outcome of engaging in evidence-based practice that in turn enhances quality care (Felicilda-Reynaldo & Utley, 2015).

Identification of Gaps and Limitations of the Literature

Several gaps were found in the literature, mainly because of limited empirical studies conducted within the last 40 years. Dowie and Phillips (2011) stated, "Further

research is needed to look specifically at student and facilitator support in the use of high-fidelity simulation" (p. 40). Miller et al. (2010) recommended research in best practices in the use of simulation in nursing education. McCallum (2007) offered evidence that nursing students want more exposure to simulation during their education, and, likewise, nurse educators sense simulation is a powerful student learning strategy. However, much of the published research is limited (Bland, Topping, & Wood, 2011; Miller et al., 2010; Prion, 2008).

According to Mastrian et al. (2011), due to the changes and driving forces of technology advancement, information technology will continue to influence the nursing world and is now a driving force in the clinical practice and in training nursing students. This advancement will help them to acquire the necessary skills and help in transferring skills and knowledge into practice. Mastrian et al. also claimed that high-fidelity simulation in the nursing curricula would be a significant driving force in meeting the learning needs of students with technology competency. As a result, relevant research is needed.

T. A. Murray (2013) conducted a review of teaching practices between 2009 and 2012, and his report was a recommendation of continued use of high-fidelity simulation as a well-needed advancement in nursing education. Research conducted by the Carnegie Foundation for the Advancement of Teaching and Nursing Curriculum (as cited in T. A. Murray, 2013) showed faults in nursing programs included a weak nursing curriculum, inadequate preparation before entering the clinical setting, inadequate provisions for students for clinical inquiry, and no evidence-based practices.

Brewer (2011) and Reising, Carr, Shea, and King (2011) investigated effective techniques that can be used successfully in simulation training for nursing education.

Brewer further reviewed literature in which the Cumulative Index to Nursing and Allied Health Literature was used to study methods common in nursing education. Thirty-seven studies were completed between 2005 and 2010, and Brewer reviewed all thoroughly. Brewer determined that even though simulation training has become a normal practice in nursing education, research is needed to perfect its use. Brewer called for the development of appropriate tools to validate and justify the cost of high-fidelity simulation, faculty participation, and student investment.

Simulation continues to change many selections in the clinical practice setting. Nagle, McHale, Alexander, and French (2009) reported that in Boston, Massachusetts General Hospital began a simulation program that targeted both nurses and the interdisciplinary team. A classroom was then designed, and the hospital purchased a Laerdal SimMan, a high-fidelity simulator. A training program was developed focusing on nurses in different clinical setting and included new graduates. The program was beneficial and successful, so additional funds were added to develop a simulation center. More simulators were purchased, including infant and birthing simulators. Due to the success of the simulation training, by 2009 Massachusetts General Hospital had five simulation programs providing training in critical and acute care settings and several others in specialty areas. Training included many disease processes, which nurses see daily, to help prepare nurses to face real-life situations using skills and critical thinking developed during their simulation training. Scenarios such as asthma, postpartum hemorrhage, respiratory arrest, and changes in mental status were included (Nagle et al., 2009).

The review of the literature provided information that high-fidelity simulation is important to nursing, and a few studies indicated individual skills were transferred from

the simulation context to the clinical context (Christian & Krumwiede, 2013; Lasater, 2007). Georgetown University School of Nursing and Health Studies incorporated classroom, technological, and clinical instruction into all four levels of their curriculum, and the essential teaching tool in clinical nursing courses is simulation (Christian & Krumwiede, 2013; Lasater, 2007). A minimal amount of literature discussed how simulation was helpful in a laboratory setting, which expressed ambiguous results. As discussed throughout the study, further research is needed to explore this area more thoroughly in order to validate the literature.

Qualitative Research Approach

Qualitative research. This dissertation study used a qualitative research method with a case study design. In nursing research, two methodological perspectives can be utilized: quantitative and qualitative. Quantitative methods are different from qualitative approaches because researchers are restricted to using standardized measures that place people's answers in prearranged classifications defined numerically. Quantitative methods facilitate measurement of responses of a large number of people to a group of questions to assist researchers in gathering and comparing data. Merriam (2009) noted the primary goal of a quantitative study is "prediction, control, description, confirmation, and hypothesis testing" (p. 18). A quantitative approach produces a comprehensive set of findings in a concise format generalizable to a larger population.

Case study. Within the qualitative method, several different approaches exist. A case study approach would provide insight into best practices for analyzing a situation from one or more perspectives (e.g., faculty interviews) to obtain a holistic view of the simulation program (Padgett, 2008). Case study stands apart from the other types of qualitative study because of the unit of analysis. Case study knowledge is more

substantial, circumstantial, and in depth than quantitative research methods (Merriam, 2009). By concentrating on a phenomenon (faculty perception), the interaction of significant factors and characteristic of the phenomenon can be explored, in this case in a case study. Anthony and Jack (2009) explained that the "qualitative case study method . . . is a comprehensive research strategy that can be used to describe, explore and understand or evaluate the phenomena of professional interest appropriate for many nursing contexts" (p. 1177). The case study method offers an opportunity for in-depth analysis of factual life situations and changes over time. Based on the work of Gangeness and Yurkovich (2006) and Yin (2009), the case study is holistic and supports policy change and reevaluation.

According to Bromley (1990), case study research is a "systematic inquiry into an event or set of related events which aims to describe and explain the phenomenon of interest" (p. 302). The goal is to create an accurate and complete description of the case. Bromley further stated, "The case study emphasizes the proximal causes of the behavior and circumstances, whereas life history emphasizes the remote origins, and the continuities and discontinuities in the organization of behavior over a relatively long period of time" (p. 86).

Cronin (2014) defined case study research as "a systematic investigation of a unit of analysis that is conducted over a period of time where in-depth data are collected" (p. 20). This definition strengthens the research, particularly stressing the systematic approach taken. Yin (2003) defined case study research as "an empirical inquiry that investigates contemporary phenomena within its real-life context, especially when the boundaries between phenomena and context are not clearly evident" (p. 13). Yin (2009) argued that one of the most powerful uses of the method is to explain real-life, causal

links, with the researcher being able to understand the subjective richness of individuals telling their experiences. In addition, Patton (2002) reported that the qualitative method reflects how individuals make sense out of a phenomenon and express experiences to other people.

The purpose of this qualitative case study was to describe the perceptions of invited participants who were nursing professors using computerized simulation in their curriculum via classroom and clinical training with nursing students. Therefore, a qualitative method was the most appropriate approach to data collection in order to obtain in-depth perceptions from participants. A semistructured interview with open-ended questions was used to gather such in-depth data from undergraduate nursing faculty members who use simulation in their curriculum at the university.

Research Questions

The following research questions guided the study:

1. What are the perceptions of nurse educators regarding the benefits of high-fidelity simulation as a teaching strategy for nurse candidates in a university nursing program?

2. What are the perceptions of nurse educators regarding the barriers to the inclusion of high-fidelity simulation in the nursing curriculum in a university nursing program?

3. What recommendations can be made to maximize the use and benefits of high-fidelity simulation in a university nursing program?

Chapter 3: Methodology

This chapter describes the methodology for the research study. The design is discussed, and descriptions of the sample, instruments, and methods of data inquiry are provided. A review of the informed consent process and the steps to maintain the confidentiality of participants are incorporated in this chapter. The problem addressed by this study was nurse educators' resistance to the use of computerized simulations. The purpose of this qualitative case study was to describe the perceptions of invited participants who are nursing professors using computerized simulation in their curriculum via classroom and clinical training with nursing students. Most of the studies on simulation in nursing education have examined the issue from the point of view of learners, not from the point of view of educators and colleagues who must evaluate how well simulations prepare students for real-life situations. As referenced in Chapter 2, this study was designed to answer the following research questions:

1. What are the perceptions of nurse educators regarding the benefits of high-fidelity simulation as a teaching strategy for nurse candidates in a university nursing program?

2. What are the perceptions of nurse educators regarding the barriers to the inclusion of high-fidelity simulation in the nursing curriculum of the university nursing program?

3. What recommendations can be made to maximize the use of high-fidelity simulation in a university nursing program?

Despite a general agreement among the educational community about the effectiveness of simulation training, the causes of some educator concerns have been unidentified (Ennis, 2009; Templeton, 2010). According to researchers for the NACNEP

(2010), the incorporation of high-fidelity simulation in health care programs has been a challenge for educators. Feingold et al. (2004) suggested faculty were concerned about extra time and resources needed to implement simulation. Adamson (2010) found a lack of time, a lack of support resources, and lack of funding for support resources presented critical barriers to use of simulation in nursing education. This study was designed to help develop a clear view of faculty perceptions of high-fidelity simulation use to train nursing students.

Case Study Research Design

The research design used in this study was a qualitative, exploratory case study. Case study methodology is an evolving qualitative epistemology that utilizes different methods (Yin, 2014). Case study is a methodology with strong philosophical underpinnings that provides a framework for research in real-life settings (Yin, 2014). Merriam (1998) specified three key descriptions of qualitative case studies: heuristic, descriptive, and particularistic. The description of conducting a case study was further expanded by Yin (2003) and Creswell (2013) as descriptive, exploratory, and explanatory. The exploratory methods seek to define the research question in order to develop a hypothesis. A descriptive case study seeks to describe the various characteristics of a phenomenological event in order to develop a hypothesis after collecting data. The explanatory method is utilized for "complex and multivariate theories" (Yin, 2003, p. 20).

Other research designs considered for this study included phenomenology, ethnography, and quantitative. However, each of these methods possessed a certain disadvantage. The choice of phenomenological approach had potential difficulties. In phenomenological studies, the researcher, in analyzing the data, seeks to identify one

unifying meaning common to the experience of all the participants (Creswell, 2010). This is not a likely course of action in exploring the multidimensional aspects of the different perspectives of the different faculty members. Different perceived factors will have an impact on student learning outcomes that cannot be reduced to just one common denominator. According to Creswell (2010), phenomenological studies have clear distinctions made between what was experienced and how it was experienced. Ethnographic research, according to Merriam (2009), is defined by the researcher's interpretation of the findings rather than based on how data are collected. Yin (2003) stated that, under certain conditions, case studies can be replicated and "are generalizable to theoretical propositions and not to populations or universes" (p. 10).

The nature of the research questions, the topic of interest, and goals of the study are key in choosing the research method (Padgett, 2008). The goal is to elicit detailed and subjective information from nursing faculty members who use high-fidelity simulation in their curriculum. Merriam (2009) stated that qualitative methods assist researchers in investigating issues in detail without biased notions or fixed categories of analysis, which allows for a wider scope of understanding people's interpretation of experiences. Merriam (2009) also maintained that qualitative approaches provide rich, abundant information about a small number of people in a study.

Many case study designs allow for in-depth descriptions and analyses of the effect of simulation experiences in nursing education. Flyvbjerg (2006) argued, "Case studies are essential to understanding the degree in which certain phenomena are present in a given group or how they vary across cases" (p. 241). A qualitative case study design allows for the collection of verbal information to provide for an inclusive and in-depth understanding of the studied phenomena (Merriam, 2009). In this case study, the focus of

investigation was on the faculty members' personal understandings of their evolving perceptions of using simulation training. In addition, faculty members' perceptions of the students' outcomes before and after the simulation experience were explored, along with the barriers faculty members face in the implementation of simulation within the curriculum.

The words of the faculty were analyzed to form themes to answer the research questions. A qualitative format allows for the unexpected emergence of themes and foci, which may be overlooked in a quantitative study. As a result, the goal was to gain a more subtle and distinguished understanding of the faculty members' views in relation to simulation training and their evaluation of their students' progress and benefits of the training. This case study was exploratory in nature. According to Yin (2014), the purpose in an exploratory study is explaining the research questions or procedures that could be used in further research; this approach also helped the researcher gain a deeper understanding of the nurse educators' perceived experiences related to use of simulation in nursing education programs. This research study used a single-case design with embedded units of inquiry, as described by Yin (2014). Nursing educators' perceptions in the use of simulation in the curriculum represented the case for this study.

Participants

The target participants for this study were full-time nursing faculty at a university in Florida. The target population was 30, and the possible minimum sample size was five full-time faculty members who supervise students in theory and clinical analysis before and after the implementation of simulation training.

The research study was conducted at an undergraduate nursing program that utilizes high-fidelity simulation in the curriculum. Prior to data collection, Nova

Southeastern University Institutional Review Board approval was obtained. Participants were recruited as a purposeful sample of full-time nursing faculty at a nursing program in a South Florida university.

This researcher used a purposeful sampling method to obtain data from participants using high-fidelity simulation as an instructional method in their curriculum to teach nursing students. According to Creswell (2010), using purposeful sampling is an acceptable method for this type of research; in order to obtain maximum information, qualitative researchers use the nonrandom approach of purposeful sampling to draw a sample of individuals (Creswell, 2010). The inclusion criteria were as follows: (a) presently teaching full time at a university in school of nursing, (b) experience in teaching nursing students using high-fidelity simulation in the curriculum for at least 1 year, and (c) experience and ability to compare student experiences and outcomes before and after the simulated experience. As long as the above criteria were met, the host university's Institutional Review Board would give the approval to conduct the research. The researcher obtained permission from the dean of the School of Nursing to conduct the research study.

The initial participant sample was targeted for 30 undergraduate nursing faculty to participate in face-to-face interviews. The researcher dedicated tremendous time and effort to find faculty who were willing to participate in the study. The researcher used e-mails and snowball sampling to recruit participants. After weeks of sending invites and waiting for return answers, 12 nursing faculty members who used high-fidelity simulation in their curriculum in the undergraduate nursing program responded. The faculty participants ($N = 12$) signed the Informed Consent Form and agreed to participate in the study. The sample size for qualitative research is basically less that of quantitative

methodology, because qualitative research is concerned more with meanings of the data (Yin, 2003). According to Glaser and Strauss (1967), the sample size should be enough to ensure that the majority of the important perceptions regarding a phenomenon are uncovered. If the data become repetitive and too large, data collection and analysis becomes impractical for the qualitative researcher. The researcher noted that the point of saturation could be determined in the current study due to the repetition of the content and themes.

Data Collection Tools

According to Guba and Lincoln (1989) and Merriam (2009), the most appropriate method to use in a qualitative case study is individual interviews. DeMarrais (2004) described the interview as "a process in which a researcher and participant engage in a conversation focused on questions related to a research study" (p. 55). A semistructured interview with open-ended questions gathered such in-depth data. The interviews were audio recorded and later transcribed. As a result, the analysis of the participants' narratives focused on detecting and understanding common themes that answered the research questions. Leedy and Ormrod (2010) explained that qualitative research requires lots of preparation, planning, creativity, and open-mindedness; the researcher may begin with open-ended questions and later end with specific questions to elaborate the study.

The semistructured interview falls between unstructured and standardized. Unstructured interviews are informal conversational interviews. In standardized structured interview approaches, the interviewer asks a list of open-ended questions in the exact order and with the same format of wording each time (Codd, Stapleton, Veale, FitzGerald, & Bresnihan, 2010). Using the structured script ensures each participant responds to the same questions in the same order. In a semistructured interview, the same

protocol is used with each participant, but probing or follow-up questions may be used to explore topics. According to Codd et al. (2010), the guided approach in the use of interviews is appropriate to capture the lived experience of individual participants. In qualitative interviews, open-ended questions were emphasized that probed for in-depth responses.

Prior to implementation of the research, the researcher sent interview questions to a panel of experts for critique relative to the appropriateness to the sample population, clarity, and proper wording. The panel consisted of four expert nursing faculty members: a nursing research director, a simulation director, and two full-time experienced nursing faculty with teaching background in the use of simulation. Each member of this panel was selected based on experience in nursing education using simulation, experience in nursing education research, and clinical nursing education. A review template of the questions was e-mailed to each of the selected panel members. Feedback was critically reviewed, and needed corrections were made to the interview questions.

The interview with each participant consisted of the Interview Protocol questions (Appendix A), which were used to obtain information on the faculty members' experiences in the use of simulation and their perceptions of the possible benefits and barriers to incorporating simulation into the curricula used in training nursing students. At the beginning of the interview, a brief demographic questionnaire was filled out on each participant (Appendix B).

During the interview, the interviewer summarized and restated the information that the participants provided in order to ascertain accuracy. The interviewer allowed the participant to respond to each question at her own pace with the least amount of interruption; minimize any responses and reactions; and treat the responses as

perceptions, not facts. The researcher focused on the authentic and not hypothetical information from each participant and allowed each participant her own manner of responding to the open-end questions. The researcher monitored her verbal and nonverbal reactions during the interview in order to avoid influencing participants' responses.

For this study, the location was chosen because of the feasibility of interviewing the faculty. The nursing faculty have individual offices located on the nursing campus, and the interviews were conducted by the researcher in an individual office. The researcher is a faculty member. The interviews were audio recorded after informed consent was obtained from each faculty member.

Procedures

Once the researcher obtained approval from the chief nursing officer and Nova Southeastern University Institutional Review Board, the researcher sent a letter of invitation to the nursing faculty at the university via e-mail. Contact information was provided in the letter for participants in the study to notify the researcher of their desire to participate as well as any questions. The invitation letter described the purpose of the study and any possible risks of participating in the study. From among those who indicated interest in participation, through direct e-mail, the researcher invited those who met all the inclusion criteria to participate in the study. The participants then received an Informed Consent Form that explained the protocol of the study, information on the researcher's institutional affiliation, and a description of how the results of this study would be disseminated. Participants had a week to read the information. If participants accepted and signed the consent form, then the researcher scheduled a time for the interview.

Following receipt of signed informed consent, the researcher made calls and e-

mails to schedule the interview at a time convenient for each participant. A faculty demographic survey form (Appendix B) was given to each faculty member to be completed. Interviews were conducted face to face with four participants and over the telephone with three. Five participants were administered the interview questions as a survey via e-mail. The option to use an alternative method in addition to the face-to-face interview was due to the time constraint; the work schedule and location of some faculty members prevented a face-to-face interview. Therefore, the interview process had to be customized to fit participants' schedules. Yin (2014) stated, "The skilled researcher must remember the original purpose of the case study but then must be willing to adapt procedures or plans if unanticipated events occur." (p. 74). Researchers may face difficult moments in research when trying to recruit participants who met inclusion criteria. Thus, the researcher has to make an adjustment and become resourceful to obtain the necessary data to complete the research. In the current study, interview questions were scripted and e-mailed to five participants. E-mails and telephone might not be an ideal situation in obtaining data in qualitative research (Yin, 2003). However, these methods were the most convenient ways to engage some participants for this study.

The researcher established rapport with each participant at the beginning of the interview, which was held in the faculty member's location of choice. The researcher then proceeded to the audio-taped interview (Appendix A). Each audio-taped interview lasted about 1 hour. After the interview, the researcher thanked each participant for taking part in the interview process. Participants were advised to contact the researcher with any concerns or questions. Participants were reminded that if they wished to withdraw at a later date from the study, they were free to do so. In such a case, they could e-mail the researcher and provide the assigned code that was on the Informed Consent

Form. The researcher would identify the participant by code provided and then destroy data collected from that participant. The data would not be used in the study or publication.

The face-to-face and telephone interviews were audio-recorded with participants' permission, and transcribed copies of the interview were returned to each study participant for member checking to ensure the accuracy of the transcribed content. The researcher also took field notes during the study to record the researcher's observations and experiences during the data collection process. The researcher was able to review the field notes frequently during the transcription member-checking process to clarify any words that might have been in question from the audio recording.

Data Analysis

Interview data were transcribed. As explained by Creswell (2013), data analysis consists of reading the qualitative data transcriptions carefully to identify the general themes of the entire statement and look for all the meanings. Yin (2011) stated that data analysis could be structured in five-phased cycles: compiling, disassembling, reassembling, interpreting, and concluding. The data analysis began after each participant interview was completed and each participant had reviewed the transcript of the interview (member checking). In Phase 1, the data were transcribed.

In Phase 2, formal coding was done to disassemble the data (Yin, 2011). This corresponds to open coding (Corbin & Strauss, 2007), in which data are broken apart and codes used to stand for chunks of data. Coding is the process of forming and sorting the data. Codes serve as a way to label, compile, and organize the data. They also allow the researcher to summarize and combine components of data. In linking data collection and interpreting the data, coding becomes the basis for developing the analysis (Yin, 2014).

Reassembling was done in Phase 3 (Yin, 2011). The various codes from Phase 2 were analyzed to determine overarching themes (Corbin & Strauss, 2007).

Although software is available for analysis, the analytic decision must be made by the researcher (Yin, 2011). In other words, the researcher must look at data searching for patterns, insights, or concepts that are promising; themes emerge as the data are manipulated (Yin, 2014). Yin (2011) also noted, "The researcher must exercise three precautions in analysis of the data: checking and rechecking the accuracy of the data, making the analysis complete and through, and acknowledging the unwanted biases imposed by one's own values" (p. 176).

The data analysis was validated by the process of triangulation, which is a strong data collection practice (Creswell, 2013). The strategy of triangulation allowed the researcher to converge all emerging findings from multiple data gathering (Creswell, 2013). Triangulation also promotes validity and reliability in qualitative research (Merriam, 2009).

The researcher expected to use computer-assisted qualitative data analysis software to help code the narrative interview data, by identifying segments of useful information (i.e., themes) in open coding (also known as axial coding or analytical coding), as described by Corbin and Strauss (2007). However, data were hand coded due to the limited number of participants, which made use of a qualitative software package unnecessary. Transcribed data were hand-coded to identify common themes and patterns as they emerged from the interview process. Hand-coding provided a rich description of interviews in alignment with the field notes. Codes are individual pieces of descriptive terminology that describe or represent a large piece of data (Merriam, 2009).

Bogdan and Biklen (1982) defined qualitative data analysis as "looking at data,

discovering patterns, deciding what is important for learning, breaking down the information into manageable components, and then making the decision of what to communicate with other" (p. 145). Yin (2014) explained the process of coding is combining the text or visual data into small categories of information, thereby seeking evidence for the code from the data used in the study and then assigning a marker to the code. The researcher reviewed the transcribed hand-coded interview data to verify the identified themes and patterns that emerged. The information from the field notes was then aligned with the interview data to provide a clear understanding of faculty perceptions of the use of high-fidelity simulation in the undergraduate nursing curriculum. Strategies that the researcher must rely on to ensure the credibility, accuracy, and transferability of the findings include the convergence and triangulation of the data from a variety of sources (Creswell, 2013).

Ethical Considerations

The credibility and dependability of the study developed through the use of interviews conducted by the researcher. A statement regarding the protection of human participants was reviewed with each participant and included in the signed consent with an understanding of minimal risks or exposure to psychological or physical harm. Additionally, data were maintained as confidential at all times, with no identification of subjects. To protect the participants' identities, all written and computerized documents and audiotapes of the interviews received a code in order of the participants. The tapes are stored separately from the Informed Consent Forms. They do not contain names or identification information. The documents and tapes will be shredded and external drives and hard drives will be erased 5 years after completion of the dissertation.

Trustworthiness

The criteria for establishing trustworthiness are credibility, transferability, and dependability. Polit and Beck (2010) explained, "Credibility is the confidence in the truth value of the data and interpretations of them" (p. 17). The trustworthiness of the data obtained was ensured by the use of audio recordings and the researcher's notes. Member checking was used to ensure accuracy of the transcribed data. Merriam (2009) explained, "Validity and reliability of a study depend on the ethics of the investigator" (p. 228). Creswell (2010) stated that implementation of a strategy is essential to maintaining the validity and quality of a research study.

The credibility of a researcher is based on education, past performance, skill, and confidence. This investigator is an expert in the field of nursing, with experience as a clinical bedside nurse for 27 years and a nurse educator in a university nursing program for the last 7 years. In addition, in order to assure the interviews and data analysis were driven by the responses given by the participants, rather than by the investigator's hypotheses and biases, the investigator used epoche and bracketing. Merriam (2009) explained, "Epoche and bracketing (controlling) is the process the researcher engages to remove or become aware of prejudices, viewpoints or assumption regarding the phenomenon under investigation" (p. 199). By outlining potential bias prior to the study, the researcher controlled for such bias during interviews and interpretation of data.

Credibility in qualitative research refers to the ability to verify that the study is believable from the perspective of the participants. The goal of the researcher is to obtain and synthesize the participants' perspectives; therefore, credibility is the strength of qualitative research. Within this logic, no one but the participants can know what their perspective is, and an interview is the method most likely to elicit the narratives of an

individual's personal experience (Merriam, 2009).

In qualitative research, transferability is the degree to which obtained results from a small sample can be generalized to a larger population, context, or setting. The concern from generalizability is related to the case and the situation. Therefore, random sampling is used in quantitative studies; nevertheless, the emphasis of qualitative research is unique, which may not provide generalizability. The intended use of this qualitative case study was to increase the depth of understanding of the phenomena of nurse educators' perceptions in incorporating simulation into their curriculum to educate nursing students. Although this study's findings are not directly transferable to other contexts, the investigator provided sufficient descriptive data of the research sample and context.

Potential Research Bias

Due to her nursing background, the investigator acknowledged her personal viewpoints and beliefs regarding the positive impact of simulation in nursing education via the curriculum and suspended all personal judgment. All of her efforts were made by concentrating on the viewpoints of the participants. Also, the investigator utilized the method known as journaling before, during, and after the interviews. Prior to and concurrent with the data analysis, she reflected on personal experience and opinions about the phenomena under study and recorded this information in a journal. As noted, the researcher used epoche and bracketing to acknowledge and control for personal bias (Merriam, 2009).

Summary

The methodology encompassed in Chapter 3 of this research study was a qualitative study using a case study design and semistructured interviews. The researcher explored the perceptions of nurse educators incorporating high-fidelity simulation into

the curriculum to teach nursing students, including benefits and the potential barriers they encounter and recommendations to maximize the use and benefit of simulation in a university nursing program. Yin (2011) explained that using a qualitative case study format allows the researcher to obtain rich, in-depth information to understand specific groups and situations. High-fidelity simulation is a new instructional technique that has evolved in nursing education. Simulation is used to enhance learning and to promote critical-thinking skills of nursing students.

Chapter 4: Data Collection and Analysis

The purpose of the qualitative research case study was to describe the perceptions of nursing faculty using high-fidelity simulation in their curriculum to educate the nursing student. Interviews were used to investigate faculty perceptions of the effectiveness of simulation in assessing student learning outcomes for safe, clinical practice. In qualitative research, to investigate a phenomenon in depth, the researcher makes every attempt to have personal contact and develop close rapport with the participant in the study. Chapter 4 presents a detailed description of data collected and analysis. Transcribed data were hand-coded to identify common themes and patterns as they emerged from the interview process.

Description of Sample

The first part of the data collection process was knowing where and how the researcher would collect the needed data. The data collection adhered to Yin's (2003) case study methodology of an exploratory case study. According to Yin (2014), the researcher must make an effort to avoid bias by not having preconceived ideas or assumptions when analyzing the data of a research study. The researcher used epoche and bracketing (Merriam, 2009) to outline potential bias prior to the study, thereby controlling for such bias during interviews and interpretation of data. According to Merriam (1998), in qualitative studies, the researcher is the data collection instrument. "Because the primary instrument in qualitative research is human, all observations and analyses are filtered through that human being's worldview, values, and perspective" (Merriam, 1998, p. 22).

Today most undergraduate nursing programs use simulation as part of their clinical requirements. According to Calysta (2011), many universities are using high-

fidelity simulation as part of their advertising for student recruitment. The research study was conducted at an undergraduate nursing program that utilizes high-fidelity simulation in the curriculum. Prior to data collection, Nova Southeastern University Institutional Review Board approval was obtained. Participants were recruited as a purposeful sample of full-time nursing faculty at a nursing program in a South Florida university.

The initial participant sample was targeted for 30 undergraduate nursing faculty to participate in face-to-face interviews. Twelve nursing faculty members in the undergraduate nursing program who used high-fidelity simulation in their curriculum responded. The faculty participants signed the Informed Consent Form and agreed to participate in the study.

Faculty participants answered the open-ended questions in the semistructured interview protocol (Appendix A) related to the central research questions. Open-ended questions were used to encourage participants to develop and elaborate on their perceptions of using high-fidelity simulation in their curriculum. The qualitative data were analyzed to unearth the main themes that represented faculty perceptions of high-fidelity simulation and impact on student learning and the safe transfer into clinical practice.

All respondents who met the minimum requirement of 1 year of teaching with high-fidelity simulation and were ready and able to participate during the data collection time frame were recruited for this study. Demographic information is shown in Table 1. All 12 participants had at least a master's degree. All taught in a 4-year undergraduate nursing program using high-fidelity simulation.

Results for Research Question 1

What are the perceptions of nurse educators regarding the benefits of high-fidelity

simulation as a teaching strategy for nurse candidates in a university nursing program? To answer Research Question 1, results are presented by interview question.

Table 1

Faculty Participant Demographic Information (N = 12)

Category	*n*
Female	12
Age	
45–50	10
51–70	2
Years of experience with high-fidelity simulation	
3–5	5
6–8	7
Years of teaching experience	
1–5	3
6–10	4
11–25	5
Nursing education	
Master's in nursing	12
Critical care certification	3
Advanced registered nurse practitioner	4
Doctorate	5

Interview Question 1. First, participants were asked how their program leaders learned about and began implementing high-fidelity simulation. Ten of the 12 participants (83%) noted that the lack of clinical practice sites and recognition from the board of nursing for simulation use in the nursing curriculum led to program implementation of simulation. Nursing faculty perceived that their program used simulation because of the benefits it provides in the training nurses for practice. Faculty also mentioned learning about simulation in relation to another health profession that utilized it.

Interview Question 2. Participants were asked to describe their vision of the ideal usage of simulation. All faculty replied that high-fidelity simulators help students in "patient assessment, monitoring vital signs," and "cardiac revival/code situations." Findings indicated that students could use all three types of simulators in different situations in practice, but high-fidelity simulation was deemed more suitable and provided far better training outcomes. Specific responses indicated that students can apply their knowledge in emergencies following use of high-fidelity simulation to better assess patient condition and respond appropriately. Faculty recognized that the skills students develop using high-fidelity simulation can be transferred to practice.

All 12 faculty participants stated that the use of high-fidelity simulation provided a nonthreatening, safe environment for student learning. Undergraduate students can learn the basic nursing process safely through simulation. The high-fidelity simulation allows them continuous repetition to improve skill sets. Students often make mistakes, especially in medication administration; using simulation rather than working with a real patient, no one is harmed, and the student can correct the mistake without feeling afraid or intimidated. Participant 1 stated, "You can control the scenario and the response from the patient, thereby allowing student reaction." Participant 4 stated, "Students feel less intimidated knowing it is a practice environment." Participant 7 stated, "I observed the difference in my students' skills in the clinical site after recurring practice in the simulation lab."

Interview Question 3. What are the benefits of high-fidelity simulation? The faculty responses included the safe learning environment for the student to practice nursing skills and better assessment and taking of vital signs. Students could practice emergency situations, such as a cardiac arrest scenario, having the patient deteriorate and

then calling a code blue. Simulation helped students in changing dressings; administering IV, intramuscular, subcutaneous, and oral medications; inserting and removing IVs; inserting Foley catheters; and watching a birth. The biggest perception of faculty was improvement of student skills in using high-fidelity simulation along with the improvement of critical thinking.

The four major themes reported by the majority of educators were patient safety and safe learning environment, noted by all 12 faculty; helping students acquire and retain knowledge (n = 10); increasing students' competency skills (n = 11); and building students' self-confidence (n = 11). The faculty's perceptions were that the safety of patient comes first, and students can use simulation to practice nursing skills in a safe environment. The student can make mistakes and learn to correct the mistake, which results in safety for the student and patient in the clinical practice area.

Interview Question 4. Is the knowledge gained from the students' experiences through high-fidelity simulations transferred to the clinical setting? Participants responded that knowledge did transfer to the clinical setting, citing enhanced teamwork and collaboration; increased competency, skills, and self-confidence; and improved critical thinking, communication skills, and decision making. Several common themes emerged from the participants' narrative data: (a) improved critical thinking (n = 12), (b) increased student confidence (n = 6), (c) increased competence (n = 6), (d) fine tuning of skills, (e) and better understanding of nursing concepts. Participant 2 stated, "Schools choose simulators to improve students' technical and nursing skills." Participant 9 stated, "I observe self-improvement of my student in the clinical area after using simulators in the lab." Participant 3 responded, "I see improved teamwork and collaboration." The faculty perceived improvement in the students while working with classmates, but noted

that students did not like the methods used to evaluate and critique, such as being watched through a window by the nursing faculty member.

According to Cook et al. (2011), using simulation in nursing education offers an improved outcome in the area of skills, knowledge, behaviors and leads to good patient outcomes in practice. Participant 4 stated, "When I do a simulation with my students and use the simulator to teach skills, I can see a big difference in their skill sets when we go to the hospital setting." The participants' narrative data contained common comments, such as (a) "experience is beneficial and transferable," (b) "a learning process," (c) "improved clinical skills," (d) "helps with everyday practice," (e) "excellent for understanding and performing assessments," and (f) "absolute positive experience." Overall, most of the participants perceived that, with the live clinical experiences, the student sees patients in terms of standard procedures. The life-threatening experiences that they see in the clinical area are observed only. In the simulation, the educator can develop many different medical scenarios, replicate them, carry the scenario to the possible worst outcome, and produce a better experience for the students. Therefore, the student can transfer this knowledge to real practice.

Interview Question 5. How does a full day of high-fidelity simulation compare to a full day of clinical training on real patients? According to respondents, the high-fidelity simulation gives the student the ability to practice safely without causing harm to the patient. The student can develop critical thinking skills during simulation better than in a real situation with an actual patient. With the high-fidelity simulation, the student participates more intensely and has hands-on experience. In the clinical setting, most experience is only by observation. Several comments emerged from the participants' narrative data, such as "experience is safer with high-fidelity simulation," "beneficial,"

"it is a learning process," "very informative," "it is not wasting time," "improved clinical skills," "helps with everyday practice," "takes uncertainty out of practice," "excellent and out of harm's way for the students in doing and understanding assessments," "absolutely safe learning experience," "decreased anxiety level in students," and "more hands on." Respondents indicated high-fidelity simulation provides a great learning experience that is safe and nonthreatening.

In professional practice, an important aspect for clinicians is to be able to evaluate and generate a decision regarding patient and take action to improve outcome. Participants suggested student can do this with high-fidelity simulation and build a foundation for clinical reasoning. Participant 5 stated, "I find that during simulation the student is forced to consider many unpredictable states within a scenario and can later use these with real patients." Participant 1 stated, "Most faculty and I believe simulation helps the student to a certain level in comparison to live clinical experiences." Participant 12 responded, "The student gets hands-on experience in the critical simulated experience, which they do not often get in the clinical. Also, they learn to work as a team." Participant 8 noted, "My students asked for more simulation practice." Participant 6 responded, "I was told by one of my students that they waste more time in the traditional clinical site, but in the simulation they get more experience."

Overall, 10 of the 12 faculty perceived the clinical experiences open a wider area of quality and consistency for each student. However, in comparison with simulated experience, the traditional clinical experience may not provide the student training on less frequent experiences. The faculty perceived that simulated experiences provided more consistency and more hands-on training than was available in the clinical experiences. They did not consider simulation to be a replacement for transitional clinical experiences

but agreed that the simulated experience for the student was very important and provided a highly skilled learning experience for the students. Participant 11 stated,

> Simulation helped to promote the safety of the real live patient. The student makes many mistakes when doing the simulation. However, when they are taken into the actual clinical setting, the patient will be safer, because the student learned how to provide safe and effective care in the simulated scenario.

Interview Question 6. How do students communicate with other members of the health care team during simulations? Are students able to provide specific rationales for their actions during the simulation scenario? Eleven of the 12 educators reported the major goals were focused on improvement in communication with the health care team to build self-confidence and competence in students. The faculty perceived that for the students to be team leaders, they must understand the development of teamwork. Participant 7 stated, "The students learned how to work as a team in the simulation scenario, and they relied on each other by asking questions and deciding how to treat the patient." Participant 8 responded, "I observed how the students learn and handle the situation better as a team; they worked well with partners, and this also teaches them how to develop leadership skills." Participant 9 shared,

> I observed in the simulation that the students rely on each other as part of the teamwork process. My fellow colleagues and I would see changes in their teamwork. They developed a form of trust and group dynamic as they worked through the simulations scenario.

Additionally, participants described getting more things done with less time. Thus, faculty perceived improved time management as an important part of simulation use.

Another important theme that emerged was the ability to communicate as a team.

Participant 3 noted that, to develop leadership skills, students must be able to communicate, both verbally and nonverbally. Participant 2 observed, "The benefit of simulation also helps the students to experience the relationship they develop with a patient and how significant their communication skills are, which can make a difference in patient outcomes." Participant 5 stated, "Students also learn how to quickly communicate a patient's condition to other health care practitioners, such as the physician, and how critical it is in the care of the patient." Participant 1 stated, "I was impressed how well the students work together; communication was improved during the simulation scenario."

Interview Question 7. How does high-fidelity simulation impact students' critical thinking skills? How does this compare to training with live patients? According to respondents, high-fidelity simulation improves student critical thinking without causing harm to the patient. The common theme that emerged was improved critical thinking, mentioned by 10 of the 12 faculty members. Faculty described deliberately setting up a scenario with mistakes along with medication errors to assess if the student could critically assess the situation. The simulated scenario helped the student to think critically and to prioritize and proceed correctly for a positive clinical outcome for the patient. Participant 11 stated, "I love to change the scenario by having the patient deteriorate to the point of coding and observe how the students critically think this through." Participant 4 stated, "It is important for the students to learn how to react to a stressful situation, be able to think critically; this also helps them develop management skills during simulation." Participant 9 stated, "Having students exposed to the use of high-fidelity simulation will provide a structure for gaining critical thinking, increase learning outcomes, and provide reinforcement of the nursing process."

Interview Question 8. Participants were asked to describe their debriefing process. In the debriefing process, students are video recorded during the simulation experience. Once all the students have completed their simulation scenario, the faculty member meets with the group and reviews the video tape. The students observe what they did correctly as well as incorrectly. Students are asked to verbalize what they observed being done incorrectly and what they could have done differently. Participant 1 explained, "The debriefing session is done in a nonthreatening way to help build student confidence, and then the student is given feedback."

According to the faculty, debriefing along with reflection is one of the most critical components in the use of simulation. A major theme in faculty responses to this question was that debriefing gives meaning to simulation, mentioned by seven respondents. Eleven respondents noted debriefing must be done in a positive setting and using open-ended questions. Six of the 12 respondents stated that evaluation of simulation and debriefing allow for skill mastery. Debriefing after a simulation experience is useful to link actual behaviors to team collaboration and to promote positive self-reflection. Debriefing immediately after the scenario helps the student to recall behaviors and team skills. It also provides an immediate view on how to improve performance. In summary, the results of this interview question suggested that all of the faculty identified the debriefing process as effective when correctly done.

According to the faculty, the students reported that debriefing is a key factor in helping them to reflect on their actions and retain the knowledge learned during simulation. The INASCL Board of Directors (2011) defined reflection as "the conscious consideration of the meaning and implication of an action, which includes the assimilation of knowledge, skills, and attitudes with pre-existing knowledge and can lead

to a new interpretation by the learner" (p. S16). The INASCL Board of Directors (2011) also published criteria to use during the debriefing: (a) establishment of an environment that supports confidentiality, trust, and self-analysis; (b) facilitation by an individual who is competent in the process and has observed the simulated experience; (c) incorporation of evidence-based debriefing methods; (d) integration of a structured debriefing framework; and (e) connection to established simulation objectives and outcomes.

Interview Question 9. Participants were asked how they use simulation in evaluation. The faculty reported the use of high-fidelity simulators as an evaluation method helps to decrease students' anxiety level in a real-life setting. The use of simulation needs to be meaningful for the students, and the use of simulation as an evaluation tool is a way to increase meaning and deepen the learning experience for students. Faculty also perceived the purpose when using simulation for evaluation is to prepare the student for clinical practice and allow students to transition to safe clinical practice. Major elements in the evaluation process, according to the faculty, are how the student cares for patients, knowledge gained, teamwork and collaboration, quality improvement, safety, and professionalism. The research revealed when faculty use simulation as an evaluation tool, the faculty perceived students gained knowledge, which can be transferred to the clinical setting.

The faculty perceived that high-fidelity simulation is useful to clinical practice. Simulation provides a way to help a student in skills performance, especially with critical thinking and communication. Simulation provides an innovative learning experience and helps to determine students' needs to help them meet their educational goals. Participant 12 stated, "I can see how well the student assessment skill improved." Participant 11 stated, "I see improvement in documentation from my students." Participant 2 stated, "I

observed my students were consistent, were appropriate in the simulation, and treated the simulated patient as a real patient. They provided the expected care and had a clear understanding of the diagnosis."

Summary. The thematic analysis of the 12 nurse faculty interviews revealed several emerging categories. Results for Research Question 1 are shown in Table 2.

Table 2

Themes for Research Question 1: Perceptions of Nurse Educators Regarding the Benefits of High-Fidelity Simulation as a Teaching Strategy

Theme	Subthemes or description
Reasons to implement high-fidelity simulation	• Lack of clinical practice sites • Recognition from the board of nursing for simulation use in the nursing curriculum
Learning outcomes: simulation as an effective teaching pedagogy	• Patient assessment • Hands-on practice of basic skills • Knowledge • Emergency scenarios • Transfer of knowledge to practice
Patient safety	
Nonthreatening, safe learning environment	• Safe place to learn from mistakes
Student self-confidence	
Teamwork and collaboration	• Transfer of knowledge to practice • Communication • Time management
Critical thinking skills	
Debriefing	• Watching videos of simulations immediately afterwards to discuss options and mistakes gives meaning to the simulation. • Positive and nonthreatening • Builds confidence • Allows for skill mastery • Links behaviors to team collaboration
Simulation effective as an evaluation tool	• Decreases student anxiety in transition to practice • Use of simulation must be meaningful • Process allows evaluation of student care for patient, knowledge gain, teamwork and collaboration, quality improvement, safety, and professionalism.

Results for Research Question 2

What are the perceptions of nurse educators regarding the barriers to the inclusion of high-fidelity simulation in the nursing curriculum in a university nursing program? To answer Research Question 2, results are presented by interview question.

Interview Question 10. What are some of the significant obstacles in the implementation of simulation in the curricula? Faculty mentioned the cost of the simulators, cost to train staff, time constraint, lack of ongoing faculty training, and being a new faculty member at the institution. Faculty also identified the lack of funds for ongoing training, the lack of technical assistance, lack of faculty buy-in, and faculty intimidation regarding the new technology. These obstacles lead to the lack of implementation of simulation into the curriculum. All 12 faculty described needing technical support. Ten faculty members noted a need for ongoing training and education. The major theme was the faculty perception that ongoing faculty training with simulators is essential to enhance the implementation of simulation into the curriculum.

Interview Question 11. What are some barriers or difficulties faculty face in facilitating simulations with their students? Educators noted the lack of staffing, the lack of technical support, difficulty developing scenarios, needed repairs to equipment, the time-consuming nature of creating scenarios, rapid changes in technology, and cost of equipment. The most commonly reported barrier, noted by 10 nurse educators, was lack of adaptation to new simulators.

Summary. Table 3 shows summary results for Research Question 2. Findings suggest that nurse educators lack ongoing technology training and technical support to use high-fidelity simulators. Faculty reported a lack of technical support to guide faculty with the use of new technology, lack of time to practice, and lack of knowledge and

familiarity with new simulators.

Table 3

Themes for Research Question 2: Perceptions of Nurse Educators Regarding Barriers to the Inclusion of High-Fidelity Simulation in the Curriculum

Theme	Subthemes or description
Costs	• Cost of simulators • Cost to train staff
Lack of ongoing faculty training	• Need faculty buy-in • Faculty intimidated by new technology • Difficulty developing scenarios
Need technical support	• Equipment repairs
Time consuming	
Rapid changes in technology	• New equipment

According to Eddington (2011), one of the main challenges for nursing schools is how to prepare nurse educators for this paradigm shift from clinical to simulated instruction. The educators need to have a wide understanding of types of simulators that are available, which best meet the needs of their learners, the scope of their use, and the degree of realism.

Results for Research Question 3

What recommendations can be made to maximize the use and benefits of high-fidelity simulation in a university nursing program? To answer Research Question 3, results are presented by interview question.

Interview Question 12. Faculty were asked, if a faculty development course was offered on simulation, what area would be of least interest to them. This question was most overlooked of the interview questions, and most faculty commented that simulation is very important in all aspects. The other answers were unclear.

Interview Question 13. Faculty were asked if a faculty development course was

offered on simulation, what area would be of most interest to them. The major themes that emerged from the data were having more realistic simulations of patient reactions and the need for a faculty development program to assist in the training and orientation to the simulators. Development would help faculty understand the simulator. Participant 11 stated, "Having regular in-services to learn about the new simulators and their functions would be a great benefit to faculty."

Interview Question 14. Faculty were asked what other supports they suggest for instructors teaching in simulation. The emerging themes were an endorsement for improving patient safety, administration providing more faculty support (n = 12), having fewer students in each clinical group (n = 12), and administration providing more training and continuing educational training on high-fidelity simulation for nursing faculty (n = 10). Also, the majority of the faculty indicated nurse educators' attitudes toward new technology are an important factor in the use and integration of high-fidelity simulation in the nursing curriculum. They also expressed the full support of administration is vital to the success of simulation implementation.

Interview Question 15. How could use of high-fidelity simulation in nursing education improve? The most common theme that emerged was learning outcomes. The nurse educators suggested the most critical steps for schools to take to improve the use of simulation is a focus on patient safety. Participant 10 stated, "Students will gain decision-making and critical thinking skills." All participants noted increased teamwork and collaboration and safe patient care. Eight participants described increased self-confidence for students. Six participants noted that high-fidelity simulation is needed to enhance student learning due to the lack of clinical sites for traditional clinical experiences. Faculty described some levels of anxiety when the students entered the interactive

simulation setting. The students later developed confidence and learned to work as a team.

Summary. According to the overall perception of faculty, how can simulation improve? Most agreed that simulation training is the ideal when combined with the actual clinical experience of nursing students. Simulation thereby enhances the understanding of learning content and practical skills when integrated into the curriculum as a teaching pedagogy. Simulation training and clinical experience improve the active learning experience; the simulation enables long-term retention of learning content. Debriefing immediately after the simulation leads to deeper understanding for students. The thematic analysis of the 12 nurse faculty interviews revealed several emerging categories. Results for Research Question 3 are shown in Table 4.

Table 4

Themes for Research Question 3: Recommendations to Maximize the Use and Benefits of High-Fidelity Simulation in a University Nursing Program

Theme	Subthemes or description
Faculty training	• More realistic simulations of patient reactions • Orientation to the simulators • Regular in-services • Nursing educators' attitudes toward new technology
Endorsement for improving patient safety	• Support of administration
Fewer students in clinical group	

Summary

The purpose of this qualitative exploratory case study was to obtain nurse educators' perceptions of integrating the use of high-fidelity simulation into the curriculum. The researcher used field notes in combination with reflection, observations,

and other data as well as interview data collected from all participants during this research study. The researcher's field notes were a guide in helping this researcher to identify main themes, concepts, issues, and questions that arose during the interview process of the data collection. Chapter 4 presented the perceptions of 12 full-time faculty teaching in a 4-year undergraduate nursing program in Florida and using high-fidelity simulation in the curriculum to teach nursing students. The age range was 36–70, and all were female. Five of the participants had a doctoral degree, and all had been teaching for longer than 1 year.

Faculty expressed their perception on the use of high-fidelity simulation and how it helps in the transfer of knowledge for the student into clinical practice. The majority of the faculty agreed that high-fidelity simulation provides a safe, nonthreatening learning environment for nursing students. Simulation provides a place of safety for the student to practice skills, develop critical thinking, and become competent clinicians. Faculty explained that students can make mistakes during a simulated scenario and learn from these mistakes, without harm to a real patient. One of the critical issues in the clinical area today is decreasing the number of medical errors and mistakes that cause patients harm. The use of high-fidelity simulation also helps students learn to communicate with team members, alleviates anxiety, and built student confidence. These benefits transfer into a safe clinical practice.

Faculty also expressed their perceptions of barriers faced in the integration of simulation in the curriclum. Barriers included lack of ongoing faculty training, need for technical support, costs, and rapid changes in technology.

Chapter 5: Discussion

Overview of the Applied Dissertation

This chapter provides a discussion of the results of this study. The chapter includes the overview of the applied dissertation, elaboration of the findings, the interpretation of results of the study, the implications of the study, assumptions and limitations of the study, and recommendations for nursing practice and research.

The use of technology is in every current health care practice today to improve delivery of care and provide safe patient outcomes by decreasing potential for human error. The responsibility of the nurse is to provide safe and competent nursing practice in the delivery of care to all patients (Bani-Khaled, 2011). The safe learning environment of high-fidelity simulation, in addition to challenges finding adequate clinical sites to provide traditional clinical training for students, has led to the use of high-fidelity simulation to supplement clinical training of nursing students (Sampsel, Bharwani, Mehling, & Smith, 2011). This research was designed to help fill a gap in the research literature on nursing faculty perceptions of incorporating high-fidelity simulation into the curriculum. The goal of this applied dissertation study was to examine the perceptions of nurse educators regarding the benefits of and barriers to use of high-fidelity simulation with students in a university nursing program. Interviews were used in this qualitative case study to gather perceptions from educators in a university nursing program.

The problem addressed by this study was a lack of evidence in the literature regarding faculty use of high-fidelity simulation in the nursing curriculum. The use of traditional clinical methods of teaching pedagogy has changed; now, educators must accept the change by using simulation to help to nursing students transfer their skills and knowledge to the clinical practice environment. Computer-mediated courses and the use

of simulation technology are the future of higher education (Billings & Halstead, 2016).

Explanation of Findings and Interpretation of the Results

The thematic analysis of the 12 nurse faculty interviews revealed several emerging categories. Results for Research Questions 1–3 are summarized in Tables 2–4, respectively, in Chapter 4.

Research Question 1 findings. What are the perceptions of nurse educators regarding the benefits of high-fidelity simulation as a teaching strategy for nurse candidates in a university nursing program? In defining the word *perception*, Katz and Stotland (1959) theorized that attitudes have affective, cognitive, and behavioral domains, which together determine the individual's assessment of an object. The major component, therefore, of perception is the cognitive domain of attitude construct and the impact on behavioral decision making in regards to an external object such as high-fidelity human simulators. Fabrigar, MacDonald, and Wegener (2005) clarified the meaning of perceptions as attitudes that "reflect evaluations of objects on a dimension ranging from positive to negative" (p. 79), and this perception can be wide ranging. The emerging themes in relation to Research Question 1 are discussed in detail in this section.

Debriefing. The nursing faculty perceived that debriefing was one of the most critical steps in doing the simulation. Upon completion of the simulation, students can reflect on their performance, learn, and correct the mistakes they made. Debriefing is a crucial step in the simulation experience. The process allows the student to gain insight into the simulation experience. The nurse educator can analyze students' performance and give constructive criticism. The student can communicate and collaborate with the educator. Debriefing provides the opportunity for the educator to guide the student and provide feedback on the area needing improvement, and students can progress on an

individual basis (Elsevier, 2011).

In addition, debriefing allows students to reflect on their actions and experiences during simulation. Students and nurse educators can identify areas that are needed for further review and direct students toward resources based on their individual needs so they can improve (Elsevier, 2011). Debriefing also promotes understanding of learning and incorporation of theory into practice (Meakim et al., 2013). The INASCL Board of Directors (2013) confirmed that debriefing is among the best practices when using simulation in a nursing program. These best practices include terminology, professional integrity of the participant, participant objectives, facilitation, facilitator, the debriefing process, and participant assessment and evaluation (INASCL Board of Directors, 2013).

Safety. All of the nurse educators reported using simulation for teaching students patient assessment such as vital signs. Medication administration was also cited by all participants as one of the biggest safety benefits of student repetitive practice with simulation. The student is allowed to make mistakes and learn from them. With real patients, the wrong medication or wrong dose can have catastrophic consequences. In the simulation, students can learn the medications, doses, and classification along with the six rights of administering medication to the patient. The AACN (2012) reported that 48,000 to 98,000 patients die each year due to preventable errors and lack of competent care from health workers in the United States. Compliance with state and nationally mandated regulations regarding safety is expected of all nurses in providing safe and efficient care to the patient. Nurse competency must be properly evaluated. Once assessed, proper techniques must be put in place to educate nurses to develop competent skills to attain positive patient outcomes (Parker & Myrick, 2010).

Competency (learning outcomes). Another benefit of high-fidelity simulation

faculty observed was increasing student competency and skills. Hoffmann (1999) proposed that competency could be voiced as "behaviors that an individual needs to demonstrate or they may be expressed as minimum standards of . . . performance" (p. 2). Axley (2008) stated that competency, or the lack of it, is interconnected with the safety of patients. The IOM (2000) described a direct connection of competency of nurses to medical errors, defined as "the failure to complete a planned action as intended or the use of a wrong plan to achieve an aim" (p. 1). The repetition of skills during simulation exposes nursing students to many similar scenarios so the student can gain and retain knowledge. Popkess and McDaniel (2011) suggested it is beneficial for nursing faculty to integrate technology within the nursing curriculum to promote student learning and engage the student in the learning process. The National Council of State Boards of Nursing conducted a clinical study to investigate the use of simulation in nursing education. The researchers (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014) found that all the students, upon graduation, reported extreme increases in clinical competence, critical thinking, and readiness for practice. Hayden et al. (2014) agreed that their study provided enough evidence to recommend substituting up to 50% of traditional clinical practice with simulation. Similarly, in the current study, nursing faculty voiced that the use of simulation in the clinical environment is a useful pedagogy in improving student competency and learning outcomes.

Critical thinking. The nursing faculty expressed their perception that high-fidelity simulation enhanced students' critical thinking. Students can practice in an environment where mistakes result in no actual patient injury, allowing the nursing students to adjust treatment and critical thinking through the scenario, ultimately leading to safe patient outcomes in the real patient environment.

The call for skilled professional nurses is steadily increasing. The role of nursing programs is to prepare nursing students to develop critical thinking skills so they can assess a patient, problem solve, and appropriately address the health care needs of the patient. Simulations in the nursing curriculum can safetly recreate the clinical experience and assist educators in preparing future nurses.

Thompson and Rebeschi (1999) reported that critical thinking is a critical competency for nurses, but nursing education lacked a clear description and assessment of critical thinking. For many years critical thinking was labeled as one of the distinctive characteristics of the professional nurse (Lasater, 2011). Facione and Facione (1994) stressed the persistent need for critical thinking in the nursing profession, described as making decisions based on evidence. Critical thinking is required when analyzing patient data to establish care based on priority; such critical thinking is built on acquired knowledge and a holistic view of the patient's situation (Tyler, 2004). Although high-fidelity simulation is being used widely in health care education, evidence is still ambiguous regarding its effectiveness in teaching critical thinking skills to undergraduate nursing students. However, in the current study, faculty asserted that students having long and continuous exposure to high-fidelity simulation developed and improved their critical thinking skills.

Teamwork and collaboration. Eleven of the 12 faculty members perceived that simulation is beneficial to nursing students in facilitating teamwork and collaboration. Cook et al. (2011) agreed that using simulation as a training method in nursing education will have an effect on behaviors, increase knowledge and skills, and result in good patient outcomes. The NLN (2015) acknowledged that nurses are a vital part of the health care delivery team. Nurses are charged to deliver team-driven care. The NLN (2015) stressed

that educators must collaborate with other health care practitioners to develop interprofessional education practice that will open doors for nursing students. Weller (2004) found that simulation helped to develop teamwork and collaborative learning among nursing students. The results of the current study suggest use of high-fidelity simulation as part of the nursing curriculum helps students experience the dynamic of teamwork and collaboration, leading to a safe working environment and added safety in patient outcomes.

Benefits of simulation. Simulation in the nursing curriculum is now widely accepted for learning both theory and clinical practice. Nurse educators are now incorporating this technology in all phases as a teaching pedagogy. According to the nurse educators in this study, simulation is used to help substitute for lack of traditional clinical sites. More importantly, high-fidelity simulation provides a safe learning environment. Learners build confidence, learn from their mistakes, and develop competencies, without compromising patient safety. S. Cooper et al. (2010) reported positive cognitive benefits to students after the use of simulation. The nursing faculty stated that high-fidelity simulation is a valuable learning and teaching pedagogy. The IOM (2000) advocated the use of simulators to aid in preventing errors in the clinical setting. Learning experiences using high-fidelity simulation offer students the opportunity to engage in critical thinking, practice clinical skills such as assessment, and implement treatment without harm to the real patient. High-fidelity simulation bridges the classroom lecture and clinical practice area by using realistic patient scenarios.

Research Question 2. What are the perceptions of nurse educators regarding the barriers to the inclusion of high-fidelity simulation in the nursing curriculum in a university nursing program? Health care professionals have had the available use of high-

fidelity simulation for many years, but much debate exists regarding its use as a teaching tool. The focus in the literature was on the advantages it brings to students and faculty. Also, literature has described the acceptance of student and faculty of high-fidelity simulation, concerns on how student outcomes are met, and the transferability of skill to the clinical setting (Nehring & Lashley, 2009).

The barriers identified through personal experience in this study from nursing faculty were (a) the lack of staffing, (b) lack of adaptation to new simulators, (c) the lack of technical support, (d) lack of time in developing scenarios, (e) delay in repairs to equipment, (f) rapid changes in technology, and (g) cost of equipment. The literature also confirmed what faculty shared as barriers to inclusion of high-fidelity simulation into nursing curriculum: (a) lack of time and expertise in developing and implementing patient scenarios, (b) lack of time to devote to the learning needed to be successful with high-fidelity simulation, (c) lack of resources and faculty knowledge about high-fidelity simulation, (d) too many students in clinical groups, (f) lack of technical expertise and support, and (g) lack of consistency on how to implement this teaching tool (Bentley, 2012; Berkowitz, Peyre, & Johsnon, 2011; Blazeck, 2011; Conrad, Guhle, Brown, Chronister, & Ross-Alaolmolki, 2011; Kamerer, 2012; Leigh & Hurst, 2008; Monti, Wren, Haas, & Lupien, 1998).

The literature review confirmed other barriers to simulation. Wolf et al. (2011) reported barriers to the use of simulation in evaluation. Nurse educators may want to give some students the "benefit of the doubt" (Wolf et al., 2011, p. 132). Also, Wolf et al. claimed other barriers to simulation include university setting standards that are less rigorous than nursing program standards. Therefore, administrators and faculty need to work to overcome the barriers that prevent this teaching tool from being integrated into

the curriculum. A main factor in overcoming barriers is staff development, which related to Research Question 3.

Research Question 3. What recommendations can be made to maximize the use and benefits of high-fidelity simulation in a university nursing program? The interviewed faculty suggested ongoing training of faculty, having the full cooperation of all faculty and support of administration, and adequate technical assistance. Having buy-in from all faculty is a major step to maximize use of high-fidelity simulation in the curriculum. Faculty also noted the need for orientation of new faculty.

Conrad et al. (2011) pointed out a vast need for expert faculty with knowledge of simulation to investigate and promote the further use of simulation in nursing education. Anderson (2015) reported most faculty can learn about simulation by observing expert faculty at conferences, attending workshops, and reviewing simulation literature. Moreover, Davidson and Rourke (2012) reported the need for faculty training and orientation sessions. They stressed that all faculty should have training on simulation equipment to fulfill their role in the implementation of simulation. Faculty in the current study stressed the need for continuing inservice training as technology changes.

Implication of the Results for Practice

The data analysis from this study generated several important themes with implications for the nursing curriculum. The faculty perceived several major benefits of the use of simulation: patient safety, increase of student knowledge, improvement of critical thinking, and transferability of skills into the clinical environment. Specifically, participants reported that the debriefing process right after the simulation is a critical component of simulation and helps students to learn from their mistakes and improve their critical thinking skills. Use of high-fidelity simulation gives students self-confidence

and develops teamwork.

The result of this study may have an impact on the nursing curriculum. Researchers have agreed with the findings of this study that high-fidelity simulation increases nursing student learning outcomes, develops critical thinking skills, and helps in the retention of knowledge. All of the faculty observed barriers to the maximum implementation of simulation in the nursing curriculum. However, all faculty also showed a desire to learn more and to be abe to use this technology in the curriculum. Faculty clearly would appreciate additional training. Hence, the information provided in this research can help nursing administrators, curriculum developers, and faculty. This research study also helps to fill the gap in the literature concerning the use of high-fidelity simulation in nursing education.

Assumptions

The first assumption of the study was that the review of the literature was thorough and in depth. The study produced emerging categories and themes, including the following: (a) the benefit of simulation technology in nursing education, (b) the theoretical framework of constructivism, (c) the positive effect of simulation on student learning outcomes, (d) the effective use of simulation to promote patient safety, (e) the importance of debriefing after simulation, and (f) the use of simulation to improve teamwork and collaboration.

Another assumption was that the responses of the experienced nurse educators were honest. These faculty had an extensive background in nursing education, including years of clinical background, and their feedback was considered to be authentic and valuable. Finally, the interview questionnaire was assumed to be reliable and valid, as well as the data collection and interpretation processes.

Limitations

There are limitations of every research study, and case studies have limiting factors in particular. According to Creswell (2013), limitations can cause restrictions and possible weakness in a study. Miles and Huberman (1994) stated that the researcher needs to address the reliability and validity of each limitation and be aware of them during the research. Four limitations of this study are noted.

1. The small convenience sample ($N = 12$) was delimited to faculty only and did not include nursing students, who might have different perceptions regarding the benefits and barriers to simulation being included in the curricula. Further, the small sample of participants was entirely female and restricted to nurse educators employed in a nursing program located in South Florida. Therefore, findings may not be generalized to experiences of nurse educators outside of this region. The intended goal of the research was a sample size of 30 nursing faculty teaching in a 4-year university with a minimum of 1 year of experience. Although the sample size was small, the nurse faculty were able to provide ample themes for data analysis. Having a larger sample size or a sample including nursing students might have provided more strength and increased the generalizability of the study, however.

2. Participants might have been hesitant in the reporting of personal feelings and experiences with simulation use, thereby limiting the validity of findings. The use of carefully worded interview questions and efforts of impartiality by the interviewer might have alleviated this limitation.

3. Time constraint was another factor in the collection of data. The researcher had a deadline; after the initial e-mail and response, the participants had 21 days to return the survey or complete the interview. Therefore, the short response time likely affected the

response rate for this study. The researcher also believed that time constraints were a factor for many potential participants, who did not wish to sit for an hour to do an interview.

4. The limitation to a 4-year university limited the size of the sample and generalizability of findings. The findings are limited to one specific school. Many other nursing programs use simulation. The response could have been larger if the study had been open to all nursing faculty who had taught with high-fidelity simulation for at least a year at various institutions. Hence, regardless of the limitation, participants of the study were experts in the use of simulation and varied in age, work experience, and educational level.

Recommendations for Practice

The results of ideal practices to integrate simulation into the curriculum should lead to safer practitioners and better patient outcomes. The nursing faculty asserted that high-fidelity simulation improves student performance, increases patient safety, increases knowledge, develops critical thinking, and promotes teamwork and collaboration among nursing students. Continued or expanded use of high-fidelity simulation is recommended in nursing curricula. However, additional training is recommended, both orientation for new faculty and ongoing in-service training for current faculty. Staff development can improve staff attitudes toward and competency with new technology. Further, administrators should ensure adequate technology support and assistance.

Recommendations for Future Research

Nurse educators should get involved and evaluate new technologies to assess how they can best be implemented to prepare future nursing students better for clinical practice. The faculty in this study perceived that high-fidelity simulation is an effective

learning pedagogy in the classroom and clinical area. However, research is still unclear regarding the best way to utilize simulation and measure its effectiveness on student learning outcomes. Simulation is a technology pedagogy that can help the student to learn new information and be able to problem solve and diagnose patients in a safe and protected environment. The knowledge transfers to the clinical setting.

However, educators face many barriers to the use and implementation of simulation into the curriculum. It is costly and time-consuming, training for faculty is lacking, organizations lack funds, and faculty may lack administrators' support. The literature review and the results of this study lead to the conclusion that high-fidelity simulation can benefit the nursing student by improving their skills and critical thinking for actual practice. The benefit of hands-on learning can include unusual emergencies and occurs in a safe environment, not impacting real patients.

The recommendation is made for future study on the use of high-fidelity simulation in the nursing curriculum to add to the body of knowledge. A second recommendation is qualitative research on the individual critical themes that emerged during this research, such as critical thinking skills and teamwork and collaboration.

This researcher believes nurse educators have a responsibility to assess and evaluate any new technology that will assist in the preparation of nursing students to be great practitioners. Nurse educators need to be more involved determine the effectiveness of this remarkable teaching tool. The literature indicated some uncertainty about the use of simulation in student assessment, which is an area for future study.

The study presented here is a qualitative exploratory case study to investigate nurse educators' perceptions of high-fidelity simulation integration into the nursing curriculum. Therefore, results add to the body of knowledge about the use of simulation

in nursing education. However, this qualitative case study research can be replicated using a larger sample size.

Conclusion

The rapid changes in health care and large number of nurses reaching retirement age result in an increased demand for educational institutions to prepare competent nurses. Further, new nursing graduates in the workplace will encounter patients with high acuity. In addition, the lack of traditional clinical sites for the training of nursing students suggests the need for simulated learning. These learners need to be competent and skilled to enter clinical practice. For nursing program personnel to meet this demand adequately, they must adjust the curriculum by integrating high-fidelity simulation to aid in the learning outcomes of these learners. Simulation has been utilized for years by many disciplines such as aviation, military, and medicine and has proven to be effective in learning outcomes. Nursing is the latest profession to integrate simulation into curricula. This conclusion and data from this study can be used for further research on faculty perceptions of high-fidelity simulation in the nursing curriculum to help to produce skilled and competent nurse graduates.

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Appendix A

Interview Protocol

Interview Protocol

Introduction

I will first introduce myself. My name is Marline Whigham. I am a doctorial student in the Fischler College of Education, where I am completing my dissertation. I would like to thank you for participating in this study. I am conducting this study on nurse educators' perceptions of using high-fidelity simulation in their curriculum. It is possible that your responses will benefit in improving methods of teaching nursing students and revision of the nursing curriculum. If there are any questions, please feel free to ask any time during the interview. I will be using audio tape for the interview. [Administer Faculty Demographic Survey.]

1. How did your program learn about and begin implementing high-fidelity simulation?

2. What is your vision of the ideal usage of simulation?

3. What are the benefits of high-fidelity simulation?

4. Is the knowledge gained from the students' experiences through high-fidelity simulations transferred to the clinical setting? Explain.

5. How does a full day of high-fidelity simulation compare to a full day of clinical training on real patients?

6. How do students communicate with other members of the health care team during simulations? Are students able to provide specific rationales for their actions during the simulation scenario?

7. How does high-fidelity simulation impact students' critical thinking skills? How does this compare to training with live patients?

8. Describe your debriefing process.

9. Do you use simulation in evaluation? Explain.

10. What are some of the significant obstacles in the implementation of simulation in the curricula?

11. What are some barriers or difficulties you face in facilitating simulations with your students?

12. If a faculty development course was offered on simulation, what area would be of most interest to you?

13. If a faculty development course was offered on simulation, what area would be of least interest to you?

14. What other supports do you suggest for instructors teaching in simulation?

15. How could use of high-fidelity simulation in nursing education improve?

Conclusion

Thank you for taking part in the interview process. If you have any concerns or questions, please feel free to contact me. If you wish to withdraw at a later date from the study, you are free to do so. Use the e-mail provided and provide the assigned code that was on the Informed Consent Form. I will send you a confidential transcription of your interview for you to read over and correct, if necessary.

Appendix B

Faculty Demographic Survey

Faculty Demographic Survey

1. What is your highest degree earned?

__ Associate

__ Baccalaureate

__ Master

__ Doctoral

2. What is your ethnicity?

3. What is your age category?

__ 30–39

__ 40–49

__ 50–59

__ 60–76

4. How long have you been teaching in the College of Nursing?

5. Did you have an assessment in your graduate/doctoral studies?

6. Have you ever had a continuing education course on simulation?