SIMULATION: PERCEPTIONS OF FIRST YEAR ASSOCIATE DEGREE NURSING STUDENTS

A Dissertation Presented to the
Faculty of the College of Education
The University of Houston

Partial Fulfillment
Of the Requirements for the Degree of

Doctor of Education

By

Suzanne V. Dougherty

August, 2011

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Abstract

It was the purpose of this study to determine if there is a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence in learning among student nurses. The population was associate nursing degree students. The study measured by the students’ perceptions of their satisfaction and self-confidence.

There is a need for pedagogical adaptations using high-fidelity simulations to provide meaningful teaching to the nursing students. At this time, further research is needed to determine the relationship between satisfaction and the level of self-confidence among students experiencing high-fidelity- patient simulators.

In order to examine the relationship of students’ satisfaction and level of self-confidence in learning, students enrolled in a first-year associate degree nursing program in south Texas were recruited to participate in this study. After obtaining institutional review board approval, data were collected at the completion of the course. Demographic information was obtained and the students were asked to complete the survey tools developed by the National League of Nursing.

This study used a correlational design to achieve the purposes of the research. Correlational design was useful because the researcher was seeking to discover statistically significant relationships between variables. This study examined the relationship between the variables of student satisfaction and self-confidence.

The results of the study demonstrated that the students' were satisfied and felt self-confident after the simulation interaction; however, there was a weak positive correlation between the two variables.

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CHAPTER ONE

INTRODUCTION

Introduction

It was the purpose of this study to determine if there was a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses. This chapter will discuss the Background, Problem Statement, Purpose Statement, Theoretical Framework, Research Question and Hypothesis, Nature of the Study, Significance of the Study, Definition and a Summary.

Background

Holistic Nursing, In 1860 Florence Nightingale founded modern nursing with organized theory and practice. She made many recommendations that nurses be free from other duties so they could concentrate on nursing and holistic care among other things (Joel, 2006 p.7). Holistic nursing is defined as "all nursing practice that has healing the whole person as its goal". This practice recognizes the totality of the human being - the interconnectedness of body, mind, emotion, spirit, social/cultural, relationship, context, and environment (American Holistic Nurses' Association, 1998, Description of Holistic Nursing).

Challenges of Training Nurses, There are various challenges facing nursing programs in the effort to recruit and train the qualified professionals necessary to meet rising demand. Research suggested that nurses express a significant level of professional dissatisfaction, and this likely contributed to the high attrition rates in the field (O'Brien, Mooney & Glacken, 2008;

Donley, 2006). Further, nurse-training programs struggle to attract qualified candidates as they juggle dwindling resources such as time, money, facilities, and availability of nursing educators.

These challenges have necessitated pedagogical adaptations, and there was compelling evidence to indicate that the use of high-fidelity-patient simulators can provide meaningful instruction that is highly appealing to nursing students (Butler, Veltre & Brady, 2009; Kardong-Edgren, Lungstrom & Bendel, 2009; Lamontagne, McColgan, Fugiel, Woshinsky & Hanrahan, 2008; Herm, Scott & Copley, 2007). However, the expenses associated with building and maintaining a high-fidelity-patient-simulator laboratory are substantial (Bray, Schwartz, Weeks & Kardong-Edgren, 2009; Smith & Roehrs, 2009; Harlow & Sportsman, 2007; Reeves, 2006). More research is required on the effectiveness of such programming in addressing the needs of both nursing students and nursing programs in order to accurately assess the cost-effectiveness of implementing a high-fidelity-patient-simulation program (Hyland & Hawkins, 2009). This study will contribute to the growing body of knowledge regarding the effectiveness of simulations and whether they can be used to effectively offset the clinical hours traditionally spent in hospitals working directly with patients.

Challenges of Training Nurses in the clinical area, Advances in diagnostic technology and treatments are allowing people to live longer and this, paradoxically, has created a situation in which patients in hospitals have a higher acuity and more complex needs (Hyland & Hawkins, 2009; Pardue & Morgan, 2008). Changes in hospital-profit structure and greater specialization in services have also contributed to the current trend toward turning over patient hospital beds as soon as medically possible. Patient stays in hospitals have been significantly shortened over recent years, and there is no longer the opportunity, which characterized nurse training for

decades, for nursing students to engage in clinical practice with patients to develop some of the essential diagnostic and treatment skills (Donley, 2006).

Patients are discharged once it is determined that they can be treated on an outpatient basis. Procedures that once required several days in the hospital are now being done in one-day surgery (Hyland & Hawkins, 2009). Because the patients are leaving the hospital sooner, a nursing student may see patients one day and then patients are discharged before the student returns the next day, interrupting student-learning processes and skill development (Pardue & Morgan, 2008). Furthermore, there is increasing competition among nurse-training programs to obtain clinical-training time and access to relatively limited resources. This causes some nursing students to graduate from their nurse-training programs without having practiced all the necessary skills or having been exposed to a range of clinical experiences.

Introduction of simulation, High-fidelity simulation affords students the opportunity to familiarize themselves with equipment, recognize problems, refine techniques, and experience rare medical situations. High-fidelity-patient simulators are technologically advanced mannequins that closely approximate a patient. The literature supports the potential for high-fidelity-patient-simulator scenarios to appeal to a wide range of learners and a majority of studies provide compelling evidence that nursing students find simulator-scenario learning to be highly satisfactory (Bruce, Scherer, Curran, Urschel, Erdley & Ball, 2009; Mauro, 2009; Smith & Roehrs, 2009; Blunt, 2008; Burgess, 2007; Kuznar, 2007; Alinier, Hunt, Gordon & Harwood, 2006). Given the relative newness of the technology to nurse-training practice, there remain a number of questions regarding high-fidelity-patient-simulation cost-effectiveness and whether

the learning realized through practice in simulation scenarios is qualitatively and quantitatively different from learning through more traditional nurse-education pedagogies.

While there has been relatively little research that explores the relationship of teaching practice to the design features identified as central to the simulator-scenario-learning experience, as identified by the National League for Nursing in conjunction with Laerdal (Jeffries & Rizzolo, 2006), there is some evidence that faculty member perceptions and their training and comfort with using high-fidelity-patient simulators in their pedagogical practice may directly impact students' experience with simulation scenarios (Bray, et al., 2009; Jansen, Johnson, Larson,Berry & Brenner 2009; Burgess, 2007; Childs, Ravert, Boese, Meakim & Meccariello, 2007).

The researcher conducted extensive search of the literature as evidenced in Chapter Two to prepare for the simulation sessions. After a review of the literature, the researcher detected several themes that were related to the effective use of simulators: critical thinking, confidence building, teamwork, and student satisfaction. The activities performed during the simulations were guided by these findings. The research by Brown and Chronister (2009); Butler, et al. (2009); Mauro (2009); and Lamontagne, et al. (2008) found that students today are active learners and like to be engaged. In the simulation activities, students had to demonstrate critical thinking in order to prioritize patient care, develop a nursing diagnosis, and implement and evaluate their plan. The second characteristic incorporated was confidence building. During the debriefing, after the use of the simulator the researcher and students discussed strengths and weaknesses, as well as, possibilities for improvement. This is supported by the research conducted by Butler, et al. (2009); Leighton and Scholl (2009); Mauro (2009); Smith and Roehrs (2009); and O'Brien, et al. (2007). Teamwork was researched by Bray, et al. (2009); Waxman

and Telles (2009); Corbett, Miles, Gantt, Stephenson and Larson (2008); and Weller, Janson, Merry, & Robinson(2008).

The students in the scenarios had different roles during the simulation, talked to each other about what needed to be done and what had been completed, interacted with family members and collaborated if they had uncertainty. The last theme was student satisfaction. Research in this area was conducted by Bruce et al. (2009); Mauro (2009); Smith and Roehrs (2009); Blunt (2008); Burgess (2007); Kuznar (2007); and Alinier, et al. (2006). Objectives for the simulations were relevant to assist students with transitioning toward professional-nursing roles. The activities and themes were also connected to the "Associate Degree Nursing Program Outcomes" of the UTB/TSC Department of Nursing. The summary of the themes is summarized in Table 1.1 the Simulation Curriculum Matrix.

Problem Statement

There was a need to understand if there was a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence in learning among student nurses.

Simulation techniques offer meaningful training opportunities that can help bridge the gap between scholarly theory and professional practice (Leighton & Scholl, 2009; Reeves, 2006). " High-fidelity-patient simulators have been argued to be the "most effective" simulation training models available today" (Nehring, 2008, p. 109) since they create training opportunities for clinical practice that provide a sense of real-life fidelity while ensuring no patients are harmed in the course of training. This risk-free training environment has been reported by nursing students to be one of the most positive aspects of high-fidelity-patient-simulation

scenarios and might contribute to confidence-building for these students (Lamontagne, et. al, 2008; Ker, 2003). This study sought to identify a relationship between satisfaction in a course utilizing high-fidelity-patient-simulator scenarios and the level of self-confidence that is attained by virtue of simulation instruction.

Purpose Statement

The purpose of this study was to determine if there is a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses.

Setting, The University of Texas at Brownsville and Texas Southmost College is located in the southern part of Texas along the U.S.-Mexico border. The Fort Brown Campus is two blocks from Mexico. It is a unique institution as it is a collaboration of a state university and a community college. Students can enroll and graduate with a certificate in an one- or two-year program of study (certificate or associate degree) and, without changing schools or re-enrolling, continue their education to earn a bachelor's, master's or doctoral degree.

Participants, The study population consisted of 20 nursing students enrolled in a first-year associate-degree-nursing program administered through The University of Texas at Brownsville and Texas Southmost College.

Table 1.1
Simulation Curriculum Matrix

Characteristic	Research	Simulation Activity	ADN Program Outcomes
Critical Thinking	Brown & Chronister, 2009; Butler, et al., 2009; Mauro, 2009; Lamontagne, et al., 2008;	Student in various nursing roles, analyze data and physician orders. Prioritize patient care, Debriefing – student accountable for errors made strengths and weaknesses.	Integrate critical thinking in the analysis of clinical data and current literature to make decisions related to client care, professional accountability and professional nursing development.
Confidence Building	Butler, et al., 2009; Leighton & Scholl, 2009; Mauro, 2009; Smith & Roehrs, 2009; O'Brien, et al., 2007	Debriefing,what nursing diagnosis was used, was the plan developed effective, why did you make the decision you did?	Use the nursing process to plan, implement and evaluate safe, caring, therapeutic interventions.
Teamwork	Bray, et al., 2009; Waxman & Telles, 2009; Corbett, Miles, Gantt, Stephenson & Larson, 2008; Weller, Merry & Robinson, 2008	Effectively communicate with other team members on patient care, communicate with patient, family members. Effectively document patient care and actions taken	Communicate effectively with an emphasis on teaching, learning, and health promotion in oral, written and non-verbal modes Use leadership and management principles.
Student Satisfaction	Bruce, Scherer, Curran, Urschel, Erdley & Ball, 2009;Mauro, 2009; Smith & Roehrs, 2009; Blunt, 2008; Burgess, 2007; Kuznar, 2007; Alinier, Hunt, Gordon & Harwood, 2006	Objectives of the simulation are relevant to the student and transitioning from student to professional nurse.	Function within the organizational framework to implement plans of care within ethical and legal parameters.

Theoretical Framework

A theoretical framework of this study was the nature of student learning, specifically the learning styles and preferences demonstrated by today's nursing-student population. Nursing students do not share a monolithic approach to learning: Individuals demonstrate different preferences, with some students preferring solitary learning while others thrive in collaborative and social-learning situations (Rassool & Rawaf, 2007; McDonough & Osterbrink, 2005; Melrose, 2004).

There is little doubt that this current generation of students (known as the "Millennial" or "Net" generation) has been profoundly impacted by the technological developments that marked their childhood and adolescent years (Mauro, 2009; Skiba, 2006). These students are "wired" to multitask across a variety of technology platforms, and, consequently, they generally demonstrate preferences for dynamic-content delivery and ongoing stimulation (Pardue & Morgan, 2008). Studies indicate that traditional pedagogy reflecting a teacher-centered paradigm is unlikely to engage these students as effectively as student-centered-learning experiences (Murray, Belgrave & Robinson, 2006). Millennial students are inclined to favor experiential (active) learning scenarios and often respond well to collaborative learning environments (Salamonson, Andrew, & Everett, 2009; Yuan, Kunaviktikul, Klunklin, & Williams, 2008; Reeves, 2006; Tiwari, Lai, So & Yuen, 2006). For many students, the instructor as "sage" is less appealing than the instructor as "expert mentor" who guides them through their learning (Skiba & Barton, 2006; Melrose, 2004).

Advocates of high-fidelity-patient-simulator integration into nursing curricula contend that this technology, and the learning environment it creates, is a perfect match for the educational needs of the Millennial nursing student (Como, Kress & Lewental, 2009). Findings

from several recent studies suggested that high-fidelity-patient-simulator-learning experiences appeal to a variety of learners, ranging from the most solitary in orientation to the most social and collaborative (Fountain & Alfred, 2009; Bremner, Aduddell & Amason, 2008).

Research Question and Hypotheses

The purpose of the study was to determine, if there was a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses. The following research question and hypothesis were tested

Q_1: Is there a statistically significant relationship between student satisfaction with high-fidelity- patient simulation experience and self-confidence among student nurses?

H_1: There is a statistically significant positive relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses.

Nature of the study

Within a quantitative framework, a correlational design was used to achieve the purposes of the research. A purposively selected set of participants was studied in order to explore the phenomenon. Correlational design is useful for studies where the researcher is seeking to discover statistically significant relationships between variables. This study examined the relationship between the variables of student satisfaction and self-confidence. A qualitative design would not have fulfilled this researcher's intent to contribute to the growing, but needed, body of scientific evidence regarding the effects of high-fidelity-patient simulators on nursing students.

Significance of the study

There is a need for an increase in self-confidence among students that is just as important as teaching the technical skills. It is not enough to know how to perform a skill; with the high acuity levels of patients it is now critical for students to feel confident in their nursing abilities. Elizabeth Poster, PhD, RN, FAAN, is the Dean of the School of Nursing at University of Texas at Arlington and is quoted as saying "If you want a student to be involved in caring for a patient having cardiac arrest, it is not likely they will have an opportunity more than once, if ever, as a student," "Yet in simulation, a student can have this experience many times and become proficient and confident in their interventions." (Monroe, 2010 "Actively Engaged" para.3).

Pamela Jeffries, PhD, RN, FAAN, ANEF is the Dean of Academic Affairs at Johns Hopkins University School of Nursing and is recognized as an expert on the use of simulation in nursing is quoted as saying, "The research in simulation is still embryonic," "We're learning students are more self-confident when caring for simulated patients prior to caring for real patients. "Simulation allows students to actively engage an entire set of skills that few will ever have the opportunity to use during traditional clinical placements in real-life settings. And with hospitals increasingly regulating what students can and cannot do, nursing students have fewer chances to hone skills on actual patients (Monroe, 2010 "New Paradigm para. 2).

Leigh (2008 "Conclusion" para. 1) conducted a review of literature on studies that examined self-confidence and the use of simulation. She found most of the studies were small qualitative studies that used open ended questions or were anecdotal. There were some quantitative studies but they all so included a qualitative part. She did conclude that more "research is needed to determine to what extent simulation provides a verifiably effective method for developing and improving self-efficacy in nursing students" and that although there is more

research being conducted and published that nursing is far behind what has been studied in aviation, the military and even medicine. The research also needs to examine at how simulation improves self-confidence and how that then can relate to patient safety.

Definitions

The following key terms are defined for the study.

Associate-degree-nursing program. Burgess (2007) and Kuznar (2007) reported that the majority of studies examining nursing-student experiences with high-fidelity-patient-simulation scenarios have focused on baccalaureate- and graduate-nursing students. Associate-degree nursing students have been largely ignored. For the purpose of this study, the associate-nursing degree refers to a two-year program operated through a university or college that has received proper accreditation as established by the Texas State Board of Nurse Examiners. An associate-degree nursing student is one who has completed the prerequisite course requirements, maintained a 2.5 grade point average (GPA) in those courses, and passed the ACT examination.

High-fidelity-patient Simulators. Human-patient simulators are static or computerized mannequins that approximate or replicate the look, feel, and many of the functions of the human body. One of the key advantages of simulators is that they provide a risk-free interactive experience for nursing students (and other health-care professionals). These simulators frequently incorporate emotional and sensory components and are designed to prompt critical thinking, decision-making, clinical reasoning, and delegation skills in those working with them. The limitations are that the mannequins and computers are quite expensive and require ongoing maintenance and other logistical support (Smith & Roehrs, 2009; Harlow & Sportsman, 2007; Reeves, 2006). There was also evidence that obstacles associated with faculty member training

and support may impede the delivery of effective high-fidelity-patient-simulator-scenario-learning experiences (Hyland & Hawkins, 2009; Jansen, et al, 2009).

Low-fidelity simulators. Low-fidelity simulators are typically task trainers or static mannequins. These offer the opportunity for students to develop their psychomotor abilities. They are limited in their functioning and do not provide opportunities for students to practice in detail.

Moderate-fidelity simulators. Moderate-fidelity simulators mimic sounds of breathing, pulse and heart beats but do not replicate chest-inhalation movement or pupil-eye responsiveness.

Evidence based practice requires a tracking of information to determine the best practice for a specific procedure and that nurses are aware of the where to obtain that information (Chambers, 2009).

Professional Nursing is the protection, promotion, and optimization of health and abilities, prevention of illness and injury, alleviation of suffering through the diagnosis and treatment of human response, and advocacy in the care of individuals, families, communities, and populations. http://www.nursingworld.org/

Carol Durham, M.S.N., RN and Kathryn Alden, M.S.N., R.N., I.B.C.L.C. from the University of North Carolina-Chapel Hill (2008, "Table 1") described a Comparison of the Teaching/ Learning Styles with Simulation these are shown in Table 1.2 which was retrieved from http://www.ahrq.gov/qual/nurseshdbk/docs/durhamc_epsne.pdf

The clinical experience is a cause of high levels of anxiety during in nursing education and may interfere with learning. Identified causes of the high anxiety are the lack of clinical experience (Sharif and Masoumi 2005; Rhodes and Curran, 2005) performing nursing skills for

the first time and being evaluated by faculty (Kleehammer, Hart and Keck 1990). Bremner et al. (2008) conducted a study on the use of a patient simulation and the anxiety of first year students. There were 71 students who had a simulated experience one week prior to their first clinical experience. They were asked if the use of simulation, prior to the first clinical experience reduced their stress. Sixty-five percent strongly agreed or agreed, and 16% disagreed. They were also asked if they were less anxious. Forty-two strongly agreed or agreed and 23% disagreed. This was just one study and other factors may have contributed to the students still feeling stressed and anxious prior to the first clinical day, with having only one simulated experience many of the students did find it beneficial.

Summary

While the focus of the inquiry was narrow, it was relevant for contributing data on a population of nursing students, enrolled in an associate-degree program, who are rarely the subject of studies on the effects of high-fidelity-patient-simulation-scenario learning (Burgess, 2007; Kuznar, 2007). It was the intention of this researcher to determine the impact of teaching practice on the realization of learning design features of the high-fidelity-patient-simulator model during research based scenario activities with a population of associate nursing degree students, as measured by the students' perceptions of their satisfaction and self-confidence with the simulation training.

The next chapter reviews the related literature and revealed a depth of research exploring the impact of teaching practices related to simulation design features and scenario delivery on nursing-student perceptions of the simulation experience.

Table 1.2 Comparison of Teaching/Learning Styles with Simulation

Types of Simulation	Description	Advantages	Disadvantages
Low-tech (static) task trainers:e.g. food items: oranges for injections, chicken breast for biopsy, pigs feet for suturing, injecta pads, adult/child/infant mannequins, breast/gyn/prostate models, eye/ear models, IV arms, CPR mannequins case studies	Props, models or mannequins, used to practice skills and procedures	No threat to patient safety Readily available Reusable Develop rote memorization Allows for return demonstration of skill Large group of learners Low to moderate cost	Task training Consistency Learner – memorization Lower veracity Return demo without critical thinking
Simulated Patients: e.g. standardized patients (trained actors) learner/learner, educator/learner, patients playing the role of patient, female/male human models for pelvic/prostate exams, unfolding case studies	Role-playing patients for training, simulations for assessment of history taking, physical exams, communication and therapeutic psychiatric interventions	No threat to patient safety Good tool for high communication skills Provides relatively consistent experience for all students	Moderate to high cost with each use Limited learners
Screen-Based computer simulators: e.g. computer-assisted instruction (CAI), virtual reality excursions (VRE), Web-based programs	Programs to train and assess clinical knowledge and decision making	No treat to patient safety Provides relatively consistent experience for all students Reusable	Variable amount of critical thinking Moderate Cost
Complex task trainers e.g virtual reality devices such as bronchoscopy, laparoscopic surgery, IV access (Cath Sim ®), hepatic(touch cue) simulators such as pelvic exam, cardiac catheterization and stent placement, neonate (umbilical artery, lumbar, intubation) modules	High-fidelity, visual, audio, touch cues which interfaces with computers	No threat to patient safety Provides relatively consistent experience for all students Promotes realism Improves psychomotor skills	Moderate to high cost Limited learners
Human Patient Simulators **Low- Fidelity** e.g Noelle- uses compressor to birth new born every 7 minutes **Moderate Fidelity** e.g. Laerdal ™ SimMan® **High-Fidelity** e.g METI Human Patient Simulator	Full length human mannequins Simulated anatomy and physiology Computer-driven scenarios that respond as programmed Computer-driven physiological based that responds in real time interventions	No threat to patient safety High degree of realism and veracity, Low educator/learner ratio (1:5). Decreases emphasis on memorization. Consistent experience for all students. Creates a standardized setting for enhancing critical-thinking, problem solving, and decision making skills. Practice communication, delegation	High cost: start-up. maintenance. Resource intensive Limited learners Hyper-vigilance because being observed

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

It was the purpose of this study to determine if there is a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence in learning among student nurses. It is the purpose of this chapter to review the relevant literature.

This study examined how associate degree nursing students perceive the effectiveness of high-fidelity-patient-simulator scenarios in their training. In particular the research focused on teachers' instructional practices related to simulator integration and how classroom and laboratory practice support simulator-design features and contribute to student satisfaction with the training design. The literature review began with a consideration of the changing nature of health-care delivery in America and the impact that rapidly evolving technologies have had on the field of nursing (Butler et al. 2009; Como et al. 2009; Hyland & Hawkins, 2009; Linder & Pulsipher, 2008; Pardue & Morgan, 2008; O'Brien et al. 2008; Rassool & Rawaf, 2007; Donley, 2006; Melrose, 2004).

A variety of simulation options are in use today in training programs around the country, ranging from actors representing patient conditions to full-scale, high-fidelity mannequins that replicate many of the body's complex functions. An overview of these simulation options is presented (Butler, et al., 2009; Hyland & Hawkins, 2009; Leighton & Scholl, 2009; Cangelosi, 2008; Gore, Hunt & Raines, 2008; Lamontagne et al. 2008; Nehring, 2008; Herm, et al. 2007; Wallin, Meurling, Hedman, Hedegard & Fellander-Tsai, 2007; Mavis, Turner, Lovell & Wagner, 2006; Reeves, 2006; Comer, 2005; Ker, 2003).

There is a good deal of current literature exploring the manner in which nurses learn (Mauro, 2009; Pardue & Morgan, 2008; Skiba, 2006; Skiba & Barton, 2006; Melrose, 2004) and how student learning may be better realized through student-centered instructional practice, rather than from a traditional pedagogical orientation (Hyland & Hawkins, 2009; Murray, et al. 2006). Nurse learning styles have been discussed (Rassool & Rawaf, 2007; McDonough & Osterbrink, 2005; Melrose, 2004), including experiential (active) learning (Como, et al., 2009; Salamonson, et al. 2009; Yuan, et al. 2008; Reeves, 2006; Tiwari, et al. 2006), collaboration and interactivity (Melrose, 2004), immediacy and connectivity (Melrose, 2004), and multiple intelligence theory (Fountain & Alfred, 2009; Bremner, et al. 2008; Amerson, 2006; Sayles & Shelton, 2005). Incorporating technology into nursing education instruction can enhance student learning potential by tapping into different aspects of student learning (Pardue & Morgan, 2008; Skiba, 2006).

Some background on the emergence of high-fidelity-patient simulators in health-care training practice has been provided (Bray, et al. 2009; Como, et al., 2009; Hyland & Hawkins, 2009; Harlow & Sportsman, 2007). The economics of introducing and maintaining a high-fidelity-patient-simulator program has been considered (Bray, et al., 2009; Hyland & Hawkins, 2009; Smith & Roehrs, 2009; Harlow & Sportsman, 2007; Reeves, 2006). The design features of high-fidelity-patient simulators are outlined (Smith & Roehrs, 2009; Waxman & Telles, 2009) with particular attention paid to the literature exploring the relationship of these simulation programs to critical thinking (Brown & Chronister, 2009; Butler, et al., 2009; Mauro, 2009; Lamontagne, et al., 2008; Schaefer & Zygmont, 2003), feedback and support (Mauro, 2009; Herm, et al., 2007), confidence-building (Butler, et al., 2009; Leighton & Scholl, 2009; Mauro, 2009; Smith & Roehrs, 2009; O'Brien, et al., 2008), and fidelity (Bray, et al., 2009; Hyland &

Hawkins, 2009; Waxman & Telles, 2009; Corbett, et al.2008; Weller, et al. 2008; Wolf & Gantt, 2008).

Studies exploring the differences between low-fidelity simulators and high-fidelity simulators were reviewed for their relevance (Ackermann, 2009; Butler, et al., 2009; Kardong-Edgren,et al. 2009; Mauro, 2009; Tiffen, Graf & Corbridge, 2009; Wilson, Shepherd, Kelly & Pitzner, 2006; Hesselfeldt, Kristensen & Rasmussen, 2005; Register, Graham-Garcia & Haas, 2003). Best practices as they have been researched in simulation programs are noted (Butler, et al., 2009; Herm, et al., 2007; Jeffries & Rizzolo, 2006).

The literature review finally proceeds to a consideration of the recent literature on training programs for high-fidelity-patient-simulator integration into nursing programs (Pardue & Morgan, 2008; Skiba, 2006; Skiba & Barton, 2006; Melrose, 2004; Schaefer & Zygmont, 2003). One of the key considerations in implementing a simulator program is to ensure nursing faculty members are on board for program integration and trained how to best use high-fidelity-patient simulators to benefit student learning (Hyland & Hawkins, 2009; Smith & Roehrs, 2009; Lamontagne, et al., 2008). Faculty perceptions regarding the efficacy and applicability of high-fidelity-patient simulators to student-nurse training may ease simulator program integration, or serve as an obstacle to effective program realization (Bray, et al., 2009; Jansen, et al. 2009; Corbett, et al., 2008; Burgess, 2007; Childs, et al. 2007; Murray, et al., 2006). Similarly, faculty satisfaction with simulator programming also may have an impact (Hyland & Hawkins, 2009; Gore, et al., 2008; Lamontagne, et al., 2008) and influence student perceptions of their instructors with regard to the integration of these simulators (Sayles & Shelton, 2005; Melrose, 2004).

There is some research exploring how nursing students perceive simulator training programs, and this has been reviewed by (Butler, et al., 2009) and Lamontagne, et al. (2008). The majority of the literature that focuses on student nurse experience with high-fidelity-patient simulators considers student satisfaction with the learning opportunities provided through this training. The research overwhelmingly indicates that student nurses, regardless of their learning style, tend to rate training scenarios with high-fidelity-patient simulators as highly satisfactory (Bruce, et al. 2009; Butler, et al., 2009; Kardong-Edgren, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009; Blunt, 2008; Burgess, 2007; Herm, et al., 2007; Kuznar, 2007; Alinier, et al, 2006)

Background

Changes brought about as a result of rapidly advancing technology, increasing insurance cost controls, hospital corporatization, and increasing medical specialization have fundamentally altered the way treatment and services are provided to patients in America (Pardue & Morgan, 2008; Donley, 2006). This is true even as the nation is today engaged in a debate over health-care reform and the potential for universal health care to become a feature of the nation's social and political landscape. Hyland and Hawkins (2009) stated that hospitals are moving away from a model of general health-care provision and evolving into "large intensive care units" (p. 14), and that this has created a need for greater specialization in and training by medical members, and particularly as practiced by nurses working most immediately and directly with patients. Staff members at many hospitals are inevitably concerned with bottom-line considerations and just as the need for more highly skilled workers to meet the demands of intense treatment delivery continues to grow, the ability (or willingness) of hospitals to commit to long-term or expensive training programs for nurses is increasingly rare. There is compelling evidence that

high levels of professional dissatisfaction among nurses are contributing to alarming rates of attrition just as the field is experiencing a dearth of qualified new applicants (O'Brien, et al., 2007; Donley, 2006).

The effects of this market-driven-health-care environment are further complicated by the fact that the number of clinical training sites for advanced nursing skills are decreasing, as are the number of experienced nursing educators (Hyland & Hawkins, 2009; Donley, 2006). Furthermore, the pool of nurse candidates is comprised of diverse learners drawn from a range of backgrounds and experiences (Rassool & Rawaf, 2007). Melrose (2004) noted that while many nursing students are recent high school or post-secondary school graduates, there is also a growing number of nursing students who are adults making a career change or entering the workforce in order to support themselves and their families. Many of these adults are recent immigrants and may be developing their English-as-a-second-language skills (ESL) while engaged in their nurse training. For both young and older nursing students, the tuition costs associated with training may constitute a significant burden, as may travel costs associated with getting to classroom and clinical settings. This has contributed to a situation in which well-trained nurses are in high demand, but the resources necessary for preparing them for the challenging healthcare marketplace are somewhat scarcer.

One of the areas in which nurse education programs are particularly challenged is in finding ways to provide sufficient time and opportunity to provide clinical experience to nursing students. The shortened length of stay that many hospitals now observe for all but the most seriously ill patients means nurses in training have little chance to work with patients with mild to moderate conditions. These patient beds are turned over so quickly that there is no time for advancing student knowledge through exposure to these patients. The most seriously

compromised patients who remain in the clinical setting for periods of time that would likelier accommodate training opportunities are rarely appropriate for training purposes by virtue of their illness severity and the attendant risk-level. Many nursing education programs struggle to find clinical placement times and competition for these slots is fierce, particularly in areas such as pediatrics (Butler, et al, 2009; Linder & Pulsipher, 2008).

Studies indicate that nursing students who have limited clinical experience report high anxiety levels when it comes to their work with patients directly. High stress is not conducive to effective performance, and the evidence suggests that nursing students who feel overwhelmed in clinical situations exercise poorer judgment and inadequate clinical reasoning (Butler, et al., 2009). Assuring that nursing students have sufficient experience of clinical practice is a critical function of an effective training program. This state of affairs has prompted many nursing programs to explore new strategies for providing quality clinical training to new nurses while balancing bottom line considerations related to compressed periods of training time and program cost-effectiveness (Como, et al. 2009).

Simulation in Practice

Simulation techniques employing actor-patients, standardized patients, and mannequins are increasingly being embraced by nursing education programs as a way to meet the challenges of the rapidly changing health-care field and to provide meaningful, yet essentially risk-free opportunities to learn (Butler, et al., 2009; Cangelosi, 2008; Gore, Hunt & Raines, 2008; Comer, 2005). Researchers have observed that simulated clinical experiences appear to facilitate nursing students in bridging the gap between educational theory and professional practice (Leighton & Scholl, 2009; Mavis, et al. 2006).

The first simulation models employed for training purposes were introduced in aviation in the late 1930s, (Hyland & Hawkins 2009). Since that time, flight simulators have become the norm for training both military and commercial pilots. As the researchers observed, flight simulators permitted pilot trainees to develop their skills and practice crisis responsiveness in situations closely approximating the actual experience of operating an airplane without endangering actual lives. This common denominator of offering a training simulation that represented the actual challenges one might experience in a given scenario, while eliminating the actual risk(s) associated with that scenario, make simulations a highly desirable training mechanism in fields where human or equipment error can result in serious injury or even death (Wallin, et al. 2007; Reeves, 2006).

Nehring (2008) contended that high-fidelity simulators represent "the most effective form of simulation in the near future". The embrace of high-fidelity-patient simulators as a useful, perhaps critical component of nurse education, is evidenced by the number of nursing organizations, including the National Council of State Boards of Nursing (NCSBN) and the National League for Nursing, that have called for simulators to become a standardized feature of accredited nurse-training programs. Among other advantages, high-fidelity-patient simulators allow instructors to create "clinical situations that occur infrequently but are rich with learning," (Lamontagne, et al. 2008, p. 39). For example, student nurses rarely have direct clinical exposure to terminally ill patients, but a simulator scenario mimicking such conditions can be created, thereby providing students an atypical learning experience, invaluable for both its real-life fidelity and the fact that it is free from real-life risk factors.

Ker (2003) identified how some nurse education programs employ high-fidelity-patient simulators to help their nursing students develop familiarity and ease in conducting intimate

examinations and procedures before having to practice on a real person. The researcher described programs employing both high fidelity and low fidelity models in simulation. Ker noted that the focus is on serving the needs of the nursing student because "the capability to repeatedly practice both technical skills and communication skills and the capacity to identify errors in performance without compromising patients, gives the student opportunities to evaluate their own competence and confidence" (p. 35). Herm, Scott and Copley (2007) noted that many nurse educators and researchers have arrived at the conclusion that use of high-fidelity-patient simulators improves nursing students' core competencies in such areas as patient safety, management of critical events, condition identification and assessment, medical treatment prioritization, and crisis intervention.

How Nurses Learn

Just as technological innovations have significantly impacted the way health-care delivery is realized in this country, technology changes have also fundamentally impacted the way students engage in learning. Most students today belong to what is referred to as alternately the "Net Generation" or "Millennials" -- individuals born after 1982 that grew up in the period that information technologies moved indelibly into the mainstream (Mauro, 2009). As a group, these Millennials have extensive digital literacy, both deeper and wider than that demonstrated by their predecessors.

Skiba and Barton (2006) noted that this difference is responsible for a pedagogical disconnect that is frequently seen between faculty members who typically belong to the "Mature" generation (those born between 1900 and 1945) or the "Boomer" generation (1946-1964). While many mature faculty members are now retiring, more Generation X'ers (1965-

1982) are moving into faculty positions, but even many of these individuals grew up before information technologies had been fully integrated into everyday life. Generation X'ers, while on the cusp of the digital revolution, by and large experienced their own education and training through a traditional pedagogical lens. Consequently, the Millennials represent a sea-change in skill and knowledge and demonstrate an orientation to learning that is substantively different from that reflected by many of their instructors.

Pardue and Morgan (2008) suggested that Millennials bring some distinct advantages to their learning activities, identifying them as typically collaborative learners, open to cooperative efforts and group activities, and technologically competent across different mediums (PDAs, iPods, cell phones, computers). However, the researchers also referenced studies indicating that Millennials lag behind their predecessors in terms of traditional, and valued forms of communication and are less sophisticated in their reading and writing abilities. The researchers also stated that Millennials have the propensity for multitasking makes it difficult for them to focus on one activity and the volumes of information available to them create challenges for sorting through and evaluating critical data. This suggests that student learning may be better realized through student-centered instructional practice, rather than from a traditional pedagogical orientation (Hyland & Hawkins, 2009; Murray, Belgrave & Robinson, 2006). Nurse learning styles have been discussed (Rassool & Rawaf, 2007; McDonough & Osterbrink, 2005; Melrose, 2004), including experiential (active) learning (Como, et al., 2009; Salamonson, et al. 2009; Yuan, et al. 2008; Reeves, 2006; Tiwari, Yuen et al. 2006), collaboration and interactivity (Melrose, 2004), immediacy and connectivity (Melrose, 2004), and multiple intelligence theory (Fountain & Alfred, 2009; Bremner, et al. 2008; Amerson, 2006; Sayles & Shelton, 2005). Incorporating technology into nursing education instruction can enhance student learning

potential by tapping into different aspects of student learning (Pardue & Morgan, 2008; Skiba, 2006).

Some background on the emergence of high-fidelity-patient simulators in health-care training practice has been provided (Bray, et al. 2009; Como, et al., 2009; Hyland & Hawkins, 2009; Harlow & Sportsman, 2007). The economics of introducing and maintaining a high-fidelity-patient-simulator program has been considered (Bray, et al., 2009; Hyland & Hawkins, 2009; Smith & Roehrs, 2009; Harlow & Sportsman, 2007; Reeves, 2006). The design features of high-fidelity-patient simulators are outlined (Smith & Roehrs, 2009; Waxman & Telles, 2009) with particular attention paid to the literature exploring the relationship of these simulation programs to critical thinking (Brown & Chronister, 2009; Butler, et al., 2009; Mauro, 2009; Lamontagne, et al., 2008; Schaefer & Zygmont, 2003), feedback and support (Mauro, 2009; Herm, et al., 2007), confidence-building (Butler, et al., 2009; Leighton & Scholl, 2009; Mauro, 2009; Smith & Roehrs, 2009; O'Brien, et al., 2007), and fidelity (Bray, et al., 2009; Hyland & Hawkins, 2009; Waxman & Telles, 2009; Corbett, et al. 2008; Weller, et al. 2008; Wolf & Gantt, 2008).

Studies exploring the differences between low-fidelity simulators and high-fidelity simulators were reviewed for their relevance (Ackermann, 2009; Butler, et al., 2009; Kardong-Edgren, et al., 2009; Mauro, 2009; Tiffen, Graf & Corbridge, 2009; Wilson, et al. 2006; Hesselfeldt et.al 2005; Register, et al. 2003). Best practices as they have been researched in simulation programs are noted (Butler, et al., 2009; Herm, et al., 2007; Jeffries & Rizzolo, 2006).

The literature review proceeds to a consideration of the recent studies on training programs for high-fidelity-patient-simulator integration into nursing programs (Pardue & Morgan, 2008; Skiba, 2006; Skiba & Barton, 2006; Melrose, 2004; Schaefer & Zygmont, 2003).

One of the key considerations in implementing a simulator program is to ensure nursing faculty members are on board for program integration and trained in how to best effect use of high-fidelity-patient simulators to benefit student learning (Hyland & Hawkins, 2009; Smith & Roehrs, 2009; Lamontagne, et al., 2008). Faculty perceptions regarding the efficacy and applicability of high-fidelity-patient simulators to student-nurse training may ease simulator program integration, or serve as an obstacle to effective program realization (Bray, et al., 2009' Jansen et al; 2009; Corbett, et al., 2008; Burgess, 2007; Childs, et al. 2007; Murray, et al., 2006). Similarly, faculty satisfaction with simulator programming also may have an impact how student learning may be better realized through student-centered instructional practice, rather than from a traditional pedagogical orientation (Hyland & Hawkins, 2009; Murray, et al., 2006). Nurse learning styles have been discussed (Rassool & Rawaf, 2007; McDonough & Osterbrink, 2005; Melrose, 2004), including experiential (active) learning (Como, et al., 2009; Salamonsonet al. 2009; Yuan, et al. 2008; Reeves, 2006; Tiwari, et al. 2006), collaboration and interactivity (Melrose, 2004), immediacy and connectivity (Melrose, 2004), and multiple intelligence theory (Fountain & Alfred, 2009; Bremner, et al. 2008; Amerson, 2006; Sayles & Shelton, 2005). Incorporating technology into nursing education instruction can enhance student learning potential by tapping into different aspects of student learning (Pardue & Morgan, 2008; Skiba, 2006).

There is some research exploring how nursing students perceive simulator training programs, and this has been reviewed by (Butler, et al., 2009) and Lamontagne, et al. (2008). The majority of the literature that focuses on student nurse experience with high-fidelity-patient simulators considers student satisfaction with the learning opportunities provided through this training. The research overwhelmingly indicates that student nurses, regardless of their learning

style, tend to rate training scenarios with high-fidelity-patient simulators as highly satisfactory (Bruce, et.al 2009; Butler, et al., 2009; Kardong-Edgren, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009; Blunt, 2008; Burgess, 2007; Herm, et al., 2007; Kuznar, 2007; Alinier et al.2006)

Traditional Nurse Training

For decades, nurse training in America followed a model of divided curricula and practice with the instructive portion of the training occurring in the classroom setting, and most often via lectures and presentations by the instructor, while application and practice of clinical skills occurred in a separate clinical setting, typically with a 1:10 faculty-to-student ratio (Hyland & Hawkins, 2009; Murray et al. 2006). This traditional teaching paradigm was not isolated to nursing education, of course, but characterized the American educational delivery from elementary through secondary education and has been common in many university classes as well. The top-down, hierarchical view of instruction proceeded from a view of the teacher as the "sage" or leader of the class -- the disseminator of knowledge, with an emphasis on the delivery of content facts in a static, teacher-centered manner (Melrose, 2004). Group learning activities are rarely emphasized under this perspective. From the traditional teaching vantage point, the teacher directs learning by imparting information (Skiba & Barton, 2006).

For nursing educators versed and comfortable in this approach to instruction, the particular style differences by Millennial nursing students can be confusing and frustrating. Pardue and Morgan (2008) noted that the multitasking behaviors that many of these students regularly engage in, checking email or shopping online while sitting in class, are frequently perceived by instructors as evidence of boredom or lack of comprehension or just simple rudeness. The researchers suggested that, often, the Millennial student is unaware that these

multitasking behaviors are considered unacceptable within the classroom environment. Further, their own learning styles tend not to be engaged fully through traditional pedagogy so that they may naturally resist efforts to lead them through traditionally-grounded instruction. Skiba (2006) noted that it's difficult to fault nursing students for tuning out instructors' presentations when, for instance, a PowerPoint slideshow is introduced only to "reiterate facts directly from the text" (p. 278).

The key to instructing Millennial students, researchers contend, is not to abandon tried and true pedagogy completely, but to integrate active and hands-on methods encouraging experiential learning. Pardue and Morgan (2008) stated that embracing these newer methods may require some bravery and risk-taking on the part of nursing educators, who may have to arrive at a new understanding of their relationship to their students. But the researchers argued that teachers will benefit from opening themselves to the degree of digital awareness and ease of use Millennial students evince and that the teachers' own technology capabilities will improve and their receptiveness to emerging best practices will be supported and developed. As teachers make themselves available to the potential for a Millennial-appropriate pedagogy, they are likely to have an easier time reaching these students and developing more traditional communicative skills in these students, through their modeling of critical thinking through reflection, and conveying the value of developing reading, writing and analytical skills.

Increasingly, the nursing skills laboratory has come to incorporate aspects of the instructive curricula as well with laboratory practice moving beyond simple skills acquisition and assessment to engage students' critical thinking more directly (Hyland & Hawkins, 2009). This has necessitated changes in nurse-training pedagogy. The shift represents a move toward a

constructivist approach, emphasizing student learning through active engagement and hands-on experience with the instructor serving as the facilitator for these learning experiences.

Nurse Learning Styles

The nursing students who represent the Millennial generation are best served by a learning paradigm that is student-centered and emphasizes the construction of knowledge through experience and discovery, with the teacher serving as a mentor or expert, rather than an authoritarian figure or guru (Skiba & Barton, 2006). Many nursing students value feeling that they are part of a group and they report prizing interactions with their instructors, and particularly those who emphasize collaborative exchanges that allow for "their personal process of constructing meaning during non-evaluated student-instructor conversations" (Melrose, 2004, p. 238). The teaching strategies that support this learner-centered paradigm are varied (Rassool & Rawaf, 2007; McDonough & Osterbrink, 2005), but several general features can be identified and have direct bearing on the discussion of high-fidelity-patient simulators in nurse-training practice.

Experiential (Active) Learning

A report by Jeffries and Rizzolo (2005) found few studies that looked at increased skill learning with the use of simulation, but found that it is a valuable tool for teaching students and may lead to a quicker acquisition of skills. Students can practice the skill, become more familiar with the technology and equipment in an environment that will not cause harm to a patient.

Collaboration and Interactivity

For the Millennial generation of students, including student nurses, learning is often most effectively approached as a social activity (Melrose, 2004). This is not to suggest that education and instruction should take a back seat to play, but rather that the learning environment be a dynamic one that invites collaboration and cooperation. The benefits of collaboration could likely be argued across a range of professional practice but it is especially true for the nursing field. The essence of nursing practice is that it is wholly interactive. Even in the most circumscribed of circumstances, e.g. a nurse with a single patient the nurse is directly responsive or reactive to another individual, and most professional nursing scenarios entail many more relationships than this one-on-one. An interactive, collaborative learning environment is thus more likely to reflect the actual experience that nurses will have in their professional practice.

Group work is one of the leading mechanisms for interactivity and collaboration. Melrose (2004) stated that classroom and clinical instructional activities that incorporate group projects frequently are likely to prove very engaging and meaningful learning experiences for Millennial nursing students.

Immediacy and Connectivity

Another characteristic of Millennial learners is that the immediacy of response that characterizes their digital lives has come to shape their expectations in terms of feedback. Melrose (2004) observed that these students “expect instant access and instant response” and when they do not receive a quick turnaround on their learning, they may become disenchanted or feel discouraged in their efforts. Gone are the days when students passively awaited quarterly reports or semester final grades to track their learning. Melrose contended that faculty needs to

be prepared to respond quickly to students' queries about their learning or progress. One of the advantages of simulation technologies is that they provide exactly the immediate feedback that most Millennial nursing students respond to favorably. When the simulation activity notifies the student and/or the facilitator that a procedure has been improperly or ineffectively conducted, the student has the immediate chance to correct the effort and attempt a new solution. This kind of in-the-moment learning contributes to knowledge retention and to confidence-building.

The Engagement of Multiple Intelligence

The theory of multiple intelligence is attributed to Howard Gardner, and holds that students learn through specific and individual ways. It essentially rejects a "one-size-fits-all" approach to education. Amerson (2006) wrote that while there had been no studies of multiple intelligence instruction specific in nursing classrooms, the topic was of increasing interest and presence in nursing workshops and conferences. A multiple intelligence perspective brought to bear on nurse-training practice supported the use of interactive methods that could engage the various learning styles exhibited by a diverse body of students (Sayles & Shelton, 2005).

Amerson (2006) suggested that the engagement of multiple intelligences could be realized in a single nursing classroom lecture, so long as the instructor was willing to eschew traditional techniques. The researcher proposed that the instructor begin by asking students to identify a situation in which they had been directly taught something by a nurse or a doctor and to discuss this instance with each other (an example of interpersonal intelligence). The instructor could then outline several major learning theories and then give students a five-minute writing task asking them to compare and contrast these theories and offer their own ideas about learning. This exercise engages mathematical and logical intelligences and Amerson offered that playing

music quietly in the background while students embarked on this task would also engage musical intelligence, which is largely believed to contribute to and enhance mathematical/logical learning. Following this task, Amerson proposed the instructor utilize a PowerPoint presentation (engaging visual and verbal/linguistic intelligences) on the subject of learning, followed by a class exercise in which students build their learning both individually and collectively in a kinesthetic intelligence exercise. Amerson stated that her own experience of this practice as an instructor within her nursing education classroom was that students reported high rates of satisfaction for the unconventional teaching strategies employed and the different ways their individual learning preferences were accessed and engaged.

Fountain and Alfred (2009) connected multiple intelligence theory to student nurse learning using high-fidelity-patient simulators in their research on the learning styles exhibited by a group of baccalaureate nursing students. Students participated in the experiential lab activity which involved cardiopulmonary scenarios employing a high-fidelity-patient simulator. The students consistently expressed a strong preference for the simulated scenario learning, regardless of their learning styles. This was underscored by the researchers' identification that nursing students with a solitary learning style were equally disposed to be highly satisfied with the simulated scenario learning environment as were students who manifested a highly social (collaborative) learning style. The researchers concluded that these simulations had compelling potential to reach a variety of learners by engaging different aspects of intelligence in meaningful ways. A similar conclusion was reached by Bremner, Aduddell and Amason (2008) in their study of the impact of high-fidelity-patient simulation programming on the learning styles represented in a cohort of first year baccalaureate nursing students.

Incorporating Technology

The importance of incorporating technology into nurse training is evident throughout much of the literature discussed above. Millennial students are likeliest to respond to and benefit from strategies that meet them on their playing field, and the game today is that of highly integrated and interactive technology (Skiba, 2006). Hyland and Hawkins (2009) cited several recent articles noting that technology is playing an increasingly influential role in shaping nurse education and curricula. This is a positive development, although it is also important to note Pardue's and Morgan's (2008) cautionary note that Millennial nursing students may experience certain limitations arising from their reliance on and comfort with technology. The researchers identified that many of the college-age nursing students they encountered demonstrated a "limited ability to assess their capability agenda" and exhibited a "multitude of nontraditional learning styles that do not mesh with traditional higher educational pedagogies" (p. 79). The challenge for nursing faculty is to find ways to integrate technological innovations while modeling and encouraging students in developing the traditional educational values of "critical reflection" and rigorous intellectual inquiry.

High-fidelity Patient Simulators

Proponents of high-fidelity-patient simulators contend that they can be excellent tools for preparing nursing students for the challenges of practice and for the particular demands of today's health-care marketplace (Hyland & Hawkins, 2009). These simulators are designed as accurate-size human mannequins that simulate organic processes such as lung, heart and pulse functions, which can be altered to represent changes in functioning through computer direction. While one of the primary applications for the simulators is to develop practice in skill

acquisition, they can also be used to assess students' ability, develop their critical thinking skills and aid nursing faculty in remediation programming and in revising and improving curriculum delivery to students. Their usefulness is clear in training situations that could jeopardize the well-being of live human patients if some error occurred in the training practice. The elimination of threat to actual patients can relieve student nurses of undue and complicating fear or self-doubt in their practice of clinical skills. This can produce a training environment that is much more amenable to the necessary experimentation that accompanies complex learning. Student nurses need to be allowed the opportunity to "fail" in their clinical practice in order to learn. The high-fidelity-patient simulators provide a safe opportunity for such failure to occur without presenting a risk to actual people. While these are quite compelling benefits, it is also noted by advocates of high-fidelity-patient simulators that there is, to date, no significant body of empirical evidence establishing that high-fidelity-patient simulators produce superior learning results to more conventional methods of medical training and education (Bray, et al. 2009).

History of Simulation in Nursing

Hyland and Hawkins (2009) and Como, et al., (2009) identified the first patient-simulator model as the "Mrs. Chase" mannequin (picture 1), referred to originally as the "Chase Hospital Doll" (Herrmann, 2000) designed for the Hartford Hospital Training School in Connecticut, and first employed in the classroom in 1911. By the 1950s, these researchers reported, Mrs. Chase mannequins could be found in use in nursing programs around the country. The Mrs. Chase model was a low-fidelity simulator in that it was static and not animated so that it could not be technologically manipulated to replicate human responses across a variety of conditions or stimuli.

Figure 2.1 Mrs. Chase Mannequin

Courtesy of The Hamilton Archives at Hartford Hospital

In 2000 Eleanor Krohn Herrman a Nurse Historian and Professor Emerita at the University of Connecticut published a time line of the Chase mannequins:

1913 mannequins representing infants and children to age four were introduced based on standards set by the American Medical Association and were used to teach mothers and pediatric skills to student nurses.

1914: An improved Mrs. Chase was produced that had injectable arm sites and usable orifices.

1939: Mannequins were redesigned and included hinged joints

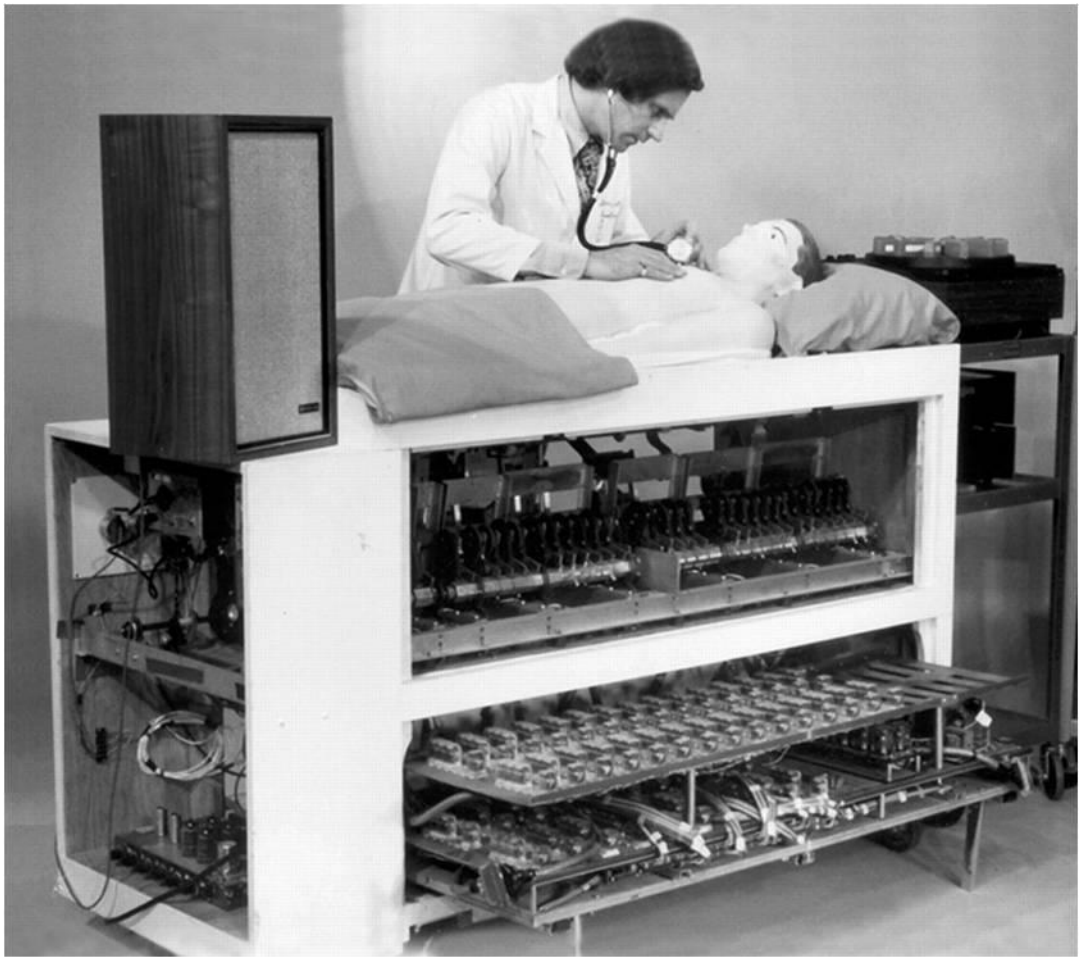
1940's: Male mannequins were introduced at the request of the U.S. Army

In the early 1960s, a more advanced simulator model, the Resusci-Anne, was introduced by Asmund Laerdal, it wasdeveloped to teach mouth-to-mouth resuscitation and was later

redesigned with internal spring mechanism which allowed for chest compression for chest compressions and allowed for airway and cardiac abilities were widely used for cardiopulmonary resuscitation training (Cooper & Taqueti, 2004). The first computer-controlled model known as the Sim One appeared in the mid-1960s and was used to train anesthesiologists it was rapidly followed by Harvey in late 1968 (figure 2.2),which was adult size and which provided heart and lung sounds. Harlow and Sportsman (2007) noted that high-fidelity-patient simulators were used most frequently in nursing schools to further advanced medical-surgical nursing skills, they are also regularly employed to train nurses in physical assessments and in the development of basic nursing skills.

Figure 2.2 Harvey Mannequin

http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1765785/pdf/v013p00i11.pdf



In January of 2000 Laerdal expanded its collaboration with Texas-based Medical Plastics Laboratories Inc. (MPL), by acquiring this innovative and exciting company. The company is now called Laerdal Texas and the flagship product produced there to date is , "SimMan® a portable and advanced patient simulator for team training. SimMan® has realistic anatomy and clinical functionality. SimMan® (figure 2.3) and SimBaby® (figure 2.4) provides simulation-based education to challenge and test students' clinical and decision-making skills during realistic patient care scenarios" http://www.laerdal.com/doc/86/SimMan#/images.

Figure 2.3 Sim Man® Mannequin

Figure 2.4 Sim Baby® Mannequin

Design Features

The Nursing Education Simulation Framework (Jeffries, 2005, 2007, as cited by Smith & Roehrs, 2009, p. 75) provided the guideline for integrating simulations into nurse-training practice. The design features outlined in the framework include providing students with clear objectives and information, allowing support for students during a simulation scenario, providing students with a problem to solve that is appropriate to their level of learning and practice, providing a debriefing (or guided feedback) following the completion of the scenario, and realizing fidelity of authenticity (realism) in the scenario experience (Waxman & Telles, 2009).

Critical Thinking

High-fidelity-patient simulators may be particularly effective in supporting critical thinking in Millennial nursing students (Butler, et al., 2009; Mauro, 2009; Lamontagne, et al., 2008). Noting that the preferred learning style(s) of these students were active, experiential and group-directed, Mauro observed that the reflective practice that undergirds critical thinking skills can be a challenge to convey to student. The researcher argued that high-fidelity-patient simulators can bridge the gap by teaching clinical decision-making skills in an interactive, engaging environment that is also risk-free.

Schaefer and Zygmont (2003) provided additional support for this argument. They noted that the teacher-centered educational paradigm that has characterized American educational delivery for decades fosters "dependent learning" in which the student is the passive recipient of content delivered by the authority (teacher). Conversely, critical thinking skills, essential to a practicing nurse who must be prepared to make rapid but clinically sound judgments, are developed through student-centered and collaborative instructional approaches that put the learner at the center of knowledge discovery and practice. High-fidelity-patient-simulator scenarios provide exactly this sort of student-centered learning experience, actively engaging students in their development and requiring them to question, assess, arrive at and revise conclusions, all hallmarks of critical thinking.

However, it is important to note that there are studies that suggest that high-fidelity-patient-simulation programs do not have a measurable impact on critical thinking development in student nurses. One comparative study of 140 nurses participating in an electrocardiogram nursing course conducted by Brown and Chronister (2009) found that the cohort of nurses engaged in weekly high-fidelity -patient simulations did not score higher on measures of critical

thinking skills than did their peers in a control group. Rather, the researchers found that critical thinking skills showed improvement the longer students continued in their nursing training (regardless of the high-fidelity-patient-simulator laboratory work) and/or experienced work situations beyond the nursing program. Conversely, Ackermann's (2009) research with nursing students engaged in a cardiopulmonary simulator learning scenario indicated that students participating in the simulations scored higher on CPR knowledge measures than did their peers in a non-simulation control group, immediately following the intervention and they retained more knowledge three months down the road on completion of their training.

Feedback and Support

Key to the effective implementation of high-fidelity-patient simulators in nurse training is the provision for immediate feedback following simulation experiences. Mauro (2009) observed that guided reflection, facilitated by the instructor, is critical to solidifying student learning. To this end, nursing students should be encouraged to comment meaningfully on their practice rather than merely stating that a procedure went "well" or "poorly." The instructor can be vital in this process, directing the student to reflect more deeply on her or his performance by asking specific questions related to the student's practice during the simulation scenario experience.

One tool for feedback and support cited by several researchers (Mauro, 2009; Herm, et al., 2007) is for instructors to videotape simulation experiences that can later be reviewed with nursing students in individual debriefings or in group discussions. The videos can be vital, for students may have a difficult time accurately recalling every step of their practice while they are engaged in the simulation scenario. A visual record of the actual experience can be extremely useful in refreshing a student's understanding of the experience and may be used to illustrate

what steps led up to a successful intervention or, conversely, may have contributed to practice error. Mauro (2009) also noted that the most effective nurse educators are those who couple positive feedback to students along with critical commentary.

Confidence-Building

Several researchers have observed that one of the key findings of high-fidelity-patient-simulation research is that nursing students frequently report it to be a confidence-building experience for them, even when they make errors during their simulation scenarios (Butler, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009). It is important to preserve this sense of comfort and confidence (O'Brien, et al., 2008) as students learn how they might improve their simulation performance.

Smith and Roerhs (2009) conducted a correlational study to determine what factors associated with high-fidelity -patient simulators contributed to positive outcomes such as student satisfaction and self-confidence. They determined that when students were challenged appropriately with specific tasks and when the instructor had identified clear objectives for the scenario, students reported high levels of satisfaction as well as greater self-confidence. They assessed five design characteristics (objectives, support, problem solving, guided reflection, and fidelity) and found that all five features taken together contributed to a significant degree of satisfaction but that, when the features were isolated, "objectives" were found to most substantively contribute to the experience of satisfaction. In terms of building self-confidence, all five features taken together accounted for the most significant impact on this variable, however Smith and Roehrs (2009) observed that "problem solving" appeared to have an individual and

positive relationship to self-confidence that the other features, when considered separately, did not.

Leighton and Scholl (2009) found that nursing students participating in a cardiopulmonary arrest training scenario utilizing a high-fidelity-patient simulator expressed the same confidence in their abilities following the training that students who had experienced a real-life cardiopulmonary scenario reported. Additionally, the researchers determined that the risk-free nature of the simulated experience allowed students to identify response deficits (such as performing chest compressions too carefully or softly) and to quickly correct them based on instructor input and debriefing.

Fidelity

One of the medical specialties in which high-fidelity-patient simulators has proven effective, and therefore, quite popular, is anesthesiology (Wolf & Gantt, 2008). The simulators have been employed to train anesthesiologists in administering invasive procedures and addressing acute responses to anesthesia. Hyland and Hawkins (2009) observed that there was actually a movement afoot to establish simulators as a standard practice protocol for anesthesiologist accreditation programs. Most of the high fidelity models available today not only provide for computer-controlled replication of pulse, breathing, and speaking but can be programmed to represent a variety of patient functions that can be produced in tandem or synchronously. Conditions such as hypotension and cardiac disturbances (such as arrhythmias) can be replicated.

Beyond providing for skill development in particular medical specialties, high-fidelity-patient simulators offer the potential to improve teamwork and increase intra-professional

exchanges (Bray, et al., 2009; Waxman & Telles, 2009; Corbett et al, Larson, Weller et al. 2008).

High-Fidelity vs. Low-Fidelity Simulators

Butler, et al.'s (2009) comparison of two cohorts of pediatric nursing students, one group working with a high-fidelity high-fidelity-patient simulator (PediaSIM) and the other working with a low-fidelity simulation model (a Laerdal static mannequin, revealed that both groups of students reported their training with the simulations to be highly satisfactory and identified their experiences as producing active learning. But the high-fidelity group reported engaging in higher levels of critical thinking (problem-solving) than did their low-fidelity peers. Further, these students reported a greater sense of feeling their simulation scenario mirrored real life and prepared them well for clinical work with real patients. They were also inclined to identify instructional best practice as that prompting active learning and promoting cooperation and diverse ways of learning.

Kardong-Edgren et al. (2009) noted that students working with an intermediate simulator (the VitalSim® model) reported high satisfaction levels with their experience that were equal to their peers using a high-fidelity model (SimMan®). However, some of the VitalSim® students later had an opportunity to experience the SimMan® in a simulation scenario and they expressed preference for the high-fidelity model over the intermediate one, citing SimMan's® greater realism. But Kardong-Edgren, et al. (2009) argued that the nursing students had demonstrably positive experiences with the VitalSim® and they contended that the substantial cost difference between the two models supported their conclusion that the VitalSim® was sufficient to many nursing students' needs and that the additional cost of the SimMan® made it a less desirable

choice. Hesselfeldt et. al (2005) might have agreed with Kardong-Edgren, et al. assessment of SimMan® since their survey of anesthesiologists, nurse anesthetists, and anesthesia residents who tested the SimMan® found this high-fidelity model somewhat lacking in accuracy in its representation of the human airway passage. While the subjects found it "acceptably realistic," they identified significant ways in which the simulator differed from an actual human.

Wilson, et al. (2006) surveyed a sample of practicing nurses engaged in a simulation exercise with a low-fidelity mannequin (The Nursing Anne Complete) and reported that the nurses found it "suitable" to educational purposes and "superior to existing training methods." However, the nurses also provided a number of recommendations for fidelity model improvement, including improving the pliability of the mannequin's "skin" to better replicate the "pinch ability" of actual human skin, and better design to mimic eye irrigation and improved IV training arm design. Tiffen, et al. (2009) conducted a comparative analysis of nursing students who experienced an hour-long low-fidelity simulation scenario addressing cardiopulmonary evaluation with those who received instruction on cardiopulmonary evaluation through a lecture format. The nursing students in the simulation cohort reported significantly greater confidence in their evaluation skills following the simulation, than did their peers in the control group following their lecture session. Tiffen, et al. (2009) concluded that even low-fidelity simulations have the potential to powerfully impact student nurses' confidence regarding their abilities.

Simulation Programs and Best Practices

A comprehensive, comparative study of simulation methods utilized in nursing education programs across the country was performed by Jeffries and Rizzolo (2006) over the course of three years in order to ascertain best practices in innovative program integrations of simulation

methodologies. The researchers reported that the most salient educational practice revealed across the simulations was the emphasis on collaboration. Related to this, the most critical feature of the design was determined to be the process of feedback or debriefing. Butler, et al. (2009) reported similar findings through their comparison of nursing students' experience of high-fidelity and low-fidelity simulators, concluding that a simulation curriculum is most effective when it delineates "clear design features and learning outcomes" (p. 135).

There were significant differences reported for the three primary simulation experiences: high-fidelity patient simulator, static (low-fidelity) mannequin, and paper/pencil case study. The nursing students who worked with the high-fidelity simulators reported a greater sense of reality in their scenario experiences than either the static mannequin or the paper/pencil case study groups. Paper/pencil case study nursing students received significantly less feedback than did the other two simulation groups (there was no substantial difference in feedback for high-fidelity or low-fidelity simulation groups) and they reported fewer opportunities to engage in active problem-solving or to make decisions related to the simulation scenario than their peers in either the high-fidelity and low-fidelity groups Jeffries and Rizzolo (2006).

In the high-fidelity and low-fidelity simulations, students were assigned one of four roles (Nurse 1, Nurse 2, significant other or observer). Students engaged in the pencil/paper case study simulations did not assume a particular role. Jeffries and Rizzolo (2006) reported that regardless of what role the student was assigned in the high or low fidelity scenario, there was no significant difference in knowledge gain related to the role, nor were there differences in satisfaction or self-confidence, although students identified as Nurse 1 did report higher levels of "judgment" in terms of post-operative adult care, than did those students assigned in the Nurse 2 role. In other words, regardless of what role they played, the high-fidelity students reported great

satisfaction with the potential to learn through the simulation scenario. Another finding was that the students in the high-fidelity-patient simulation group were likely to rate active learning as a critical aspect of nurse training while the paper/pencil case study group was less likely to identify active learning as important to knowledge gains. Similarly, the high-fidelity-patient simulation group rated "diverse ways of learning," simulation fidelity, clear objectives, feedback and support as central to effective learning while the paper/pencil group rated "collaboration" and an awareness that faculty held high expectations of them as the most critical contributors to their learning.

But perhaps the most significant finding was that the high-fidelity-patient simulation nurse students were much more satisfied with their learning experience than were the paper/pencil group. They also reported higher levels of self-confidence following their simulation experiences than did their paper/pencil case study counterparts. Interestingly, the paper/pencil cohort judged their simulation performance to be significantly more successful than the high-fidelity group of nurses. Jeffries and Rizzolo (2006) speculated that this finding might reflect the effects of more frequent and regular exposure to case study methods of learning for nursing students, than to high-fidelity-patient-simulation experiences. While the researchers lauded the benefits of any of these forms of simulation learning to enhance the development of student nurses, they appeared to favor the potential for high-fidelity simulators to provide the type of authentic, but risk-free, immersion in a simulated clinical experience. They suggested the cognitive benefits of this type of simulation experience when they observed that the high-fidelity high-fidelity-patient simulation group "perceived significantly more active learning and diverse ways of learning than did other students, and they rated active learning as the most important educational practice" (p. 12).

Herm, et al. (2007) conducted a study of 40 junior nursing students enrolled in a baccalaureate nursing program in Minnesota to assess the students use of a SimMan® in a collaborative simulation scenario (encompassing senior-health care and physiological wellness). Students performed the simulation exercise and were each debriefed within 15 minute of completing their simulation scenario as to their experience of their performance. A second debriefing for the entire group together was later conducted once all students had completed the simulation exercise and their individual debriefings. During these debriefings students were asked to critically reflect on their practice and knowledge and comment on how they believed they performed and where they identified gaps in their knowledge and practice. Two faculty members (one representing the senior-health-care curriculum and the other the physiological-wellness course) participated in observing and evaluating student performance. Each student was asked to verbally comment on their practice during the course of the simulation scenario and throughout any interventions so that the faculty members could identify and assess their critical thinking during the exercise. Following the completion of the individual simulation scenarios the students were required to perform their own documentation of the experience, outside of the clinical setting, while the faculty compared notes and their own scores, and then one faculty member performed the individual debriefing while the other reset the simulation environment in preparation for the next student.

Herm et al. (2007) observed that the scores and ratings arrived at by the faculty members were very consistent and demonstrated significant inter-rater reliability and objectivity. Greater variance was seen between the students' experience of their performance and that of the faculty. Even those students who performed poorly during the simulation exercise reported that it was a positive learning experience for them. Additionally, the Herm study revealed that in some

instances, the nursing students who the faculty had previously identified as having somewhat weaker skills for the clinical setting in fact proved to be highly competent and demonstrated strong critical thinking, in the simulated clinical environment. Conversely, and most surprising reported the researchers, was the finding that nursing students of whom the faculty had the highest expectations of success going into the simulation environment, in fact proved to be much less successful in practice. In some instances these students failed to account for changing circumstances or to take into account all the available data, leading to treatment situations that could have resulted in respiratory arrest had they been dealing with a live patient. Some of the failures were alarmingly basic, such as not confirming the patient's identity by checking a wrist band before embarking on treatment delivery. The exercise thus illustrated an area of concern in the teaching practice of the faculty members who participated in the study. They recognized that their instruction as to certain core concepts was insufficient to the students' needs, in those areas where students most consistently demonstrated difficulty during their scenarios. Furthermore, the two instructors recognized that their high expectations of certain students based on their previous experiences in clinical settings, revealed that the instructors were inadvertently prompting students in the clinical scenarios. The simulation scenarios, because they required the students to perform without input from the faculty, revealed where they were not exercising proper individual judgment in a way that clinical practice with faculty supervision had not.

Training with Simulators

As noted earlier in this chapter, the rapid integration of sophisticated technology in everyday life has profoundly impacted educational delivery in this country. Teachers are expected to understand and utilize technology tools in their classroom practice. Even more

critically, as the literature suggests, the digital explosion has fundamentally altered the way in which young people process information (Pardue & Morgan, 2008; Skiba, 2006; Skiba & Barton, 2006; Melrose, 2004). For the overwhelming number of educators raised on and trained in traditional pedagogy, what Murray et al. (2006) referred to as the "antiquated" teacher-centered educational paradigm , the challenges of instructing this new generation of learners were quite real. Schaefer's and Zygmont's (2003) study of nursing faculty members determined that while many of them "talked the talk" of a student-centered education paradigm, by and large most of the instructors reported a classroom practice that was essentially teacher-centered.

Faculty Training

Faculty practice and experience with high-fidelity-patient simulators is obviously critical to their effective integration in nursing education. Hyland and Hawkins (2009) observed that their own research suggested that nursing educators, while often receptive to the idea of implementing high-fidelity-patient simulators, may also express some reservations about their own preparation for integrating the simulators meaningfully into their teaching practice. The researchers suggested that nursing programs embarking on integrating high-fidelity-patient simulators do so with a clear awareness that faculty support and training is a critical aspect of effective simulator integration into training.

Lamontagne, et al. (2008) described how a program utilizing a high-fidelity-patient simulator was designed and embraced by faculty at Springfield Technical Community College. The researchers stated that faculty at the school was "enthused" about integrating the simulators into their classroom and clinical instruction practice. The faculty enthusiasm for the program represented the first substantial hurdle cleared in this instance; faculty resistance to the plan was

not a factor that had to be addressed. Nevertheless, Lamontagne, et al. (2008) noted that even with sufficient resources and administrative support for the simulator program, there were still some major challenges in realizing meaningful program integration. First and foremost was the amount of time that faculty found they had to devote to designing appropriate scenarios for students. Initially, the faculty was left to their own devices in designing the program and the results were uneven integration and inconsistent uses of the simulators. Students frequently reported feeling unclear about what was expected of them in a given scenario, suggesting that faculty directives were vague or the tasks not truly appropriate to the students' learning situation.

The faculty at Springfield Tech soon realized that a formalized and comprehensive integration plan was necessary to maximize the teaching benefits of the simulation scenarios. They established a team of interested faculty and administrators who were charged with creating a Simulation Template to guide use and practice with their SimMan® high-fidelity-patient simulator. The subsequent template not only provided clear direction to faculty about how to identify the skills to be learned in a given scenario, it provided the structured framework students' required to feel they understood what was being asked of them to accomplish in a given scenario and, furthermore, the structure enabled faculty to more efficiently and objectively assess student performance during scenarios (Lamontagne, et al., 2008).

The growing body of research on the use of these simulators may suggest that direction for more specific faculty training is needed. Smith and Roehrs (2009) study suggested that when instructors link clear objectives to a simulation scenario and identify a problem to be solved that is appropriate to the student nurse's training and related skill level, the greater will be the student nurse's satisfaction with the scenario experience and the likelier it is to serve as a confidence-building exercise, even if errors are realized in the nurse's simulation practice. So long as those

errors are identified and encouraging feedback is provided along with constructive criticism, the student nurse will frequently regard the work with the high-fidelity-patient simulator as a very positive learning experience. This is in keeping with one of the key findings reported for Jeffries' Rizzolo's (2006), Butler, et al., (2009) and longitudinal analysis of simulation programs, that clear feedback through instructor-led debriefings was identified as a critical design feature .

Faculty Experience and Perceptions

Jansen et al. (2009) conducted an online survey of 25 nursing faculty members drawn from a variety of baccalaureate and associate-degree-nursing programs to ascertain their perceptions on the challenges associated with integrating high-fidelity-patient simulators in nursing education practice. The key obstacles identified by the faculty members were (1) the amount of time they perceived would be required to devise effective scenarios, (2) the high level of training they believed would be required both to learn how to operate moderate- or high-fidelity mannequins, (3) the training resourses to create scenarios and integrate simulation learning across their curricula, (4) lack of facility resources and difficulty in scheduling laboratory time to work with simulators, (5) funding limitations and (6) staffing limitations, for instance and at a minimum, having someone available to operate the mannequin during simulation manipulations so that the instructor can observe the students.

The nursing faculty also made two other interesting observations regarding potential obstacles to effective simulator integration. The first of these stemmed from a question of how applicable the simulations might actually be to their teaching practice. One instructor noted that the curriculum delivered in her (or his) program was theory-centered and would not be impacted by simulation scenarios since the courses in question did not emphasize "technical skills"

(Jansen, et al., 2009, p.12). Related to this, some faculty expressed their personal interest in a high-fidelity-patient-simulator program but questioned whether their institutional colleagues would embrace and support such a program. The final obstacle identified was confusion about how to occupy other nursing students while individual students were engaged (with the instructor) in a simulation scenario. The concern here was that valuable class time would be spent on one student while the others languished in their learning opportunities in the meanwhile.

Perhaps the greatest obstacle to integrating advanced technologies such as high-fidelity-patient simulators into nurse-training programs is the potential for faculty resistance. A central tenet of educational research is that the quality and competence of the instructor is one of the single most important variables in influencing student learning. If nurse educators are reluctant to integrate high-fidelity-patient-simulation practice, and make the necessary adjustments to their teaching practice to support the use of these simulators, then it is more difficult for a high-fidelity-patient-simulation program to realize its potential in reaching student nurses. In writing about technology integration in nursing programs across the boards, Murray, et al. (2006) cautioned that some nursing faculty may be disinclined to embrace these innovations or to adapt from a content-delivery oriented approach to instruction. They may be concerned that they will be unable to fully master the technology or adjust to the pedagogical requirements of student-centered, experiential learning practice (Childs et al. 2007).

Noting that there were very few studies examining the views of health-care providers and faculty regarding the integration of high-fidelity-patient simulators in medical curricula, Bray, et al. (2009) conducted a survey of 45 university and non-university health-care providers and educators drawn from across a range of medical disciplines. The vast majority (73%) of the respondents reported strongly agreeing with the statement that high-fidelity-patient simulators

could enhance teaching and practice, improve delivery of "medical procedures, patient evaluation skills, medication therapy management, interdisciplinary health-care team interactions, and credentialing," (p. 147), while only 4% strongly disagreed with the benefits of employing high-fidelity-patient simulators in medical education programming. However, many of the respondents (89%) also noted the high costs associated with maintaining a high-fidelity-patient-simulator program and well over half the respondents (56%) expressed their belief that inadequate training of faculty as to the effective integration of high-fidelity-patient simulators in curricula and practice could severely hamper the effective use of the simulators.

Another barrier cited by the health educator respondents surveyed by Bray, et al. (2009) and Murray et al. (2006) was that comprehensive integration of high-fidelity-patient simulators would require a significant investment of time and energy on the part of faculty to learn how to meaningfully employ the simulators in their classroom and clinical training practice. Related to this obstacle was the expressed concern that administrative staff at their institution would not provide effective resource support to allow the educators to comfortably get up to speed on mannequin integration while they also had to meet their other obligations. The only difference the researchers ascertained between the university respondents and the non-university respondents was in regard to the application of the high-fidelity-patient simulator experience to actual clinical practice. The majority of university educators saw no problem with the "risk of transfer" to clinical practice, while a similar percentage of the non-university medical educators identified a mild risk. However, one might speculate that the non-university medical educators would similarly regard any isolated classroom practice as unrealistic in simulating actual clinical experience and that this difference may not be specific to the use of high-fidelity-patient simulators but extend across all forms of classroom experience and practice.

Perhaps one of the most interesting findings of the Bray, et al. (2009) study was that educators younger than 30 and older than 59 expressed little to no concern that inadequate faculty training on the use of high-fidelity-patient simulators could significantly impact effective educational integration. Conversely, over 40% of the educators between ages 30 and 59 identified inadequate faculty training as a "moderate" barrier to implementation of high-fidelity-patient simulators. Bray, et al. (2009) concluded that, overall, there was a high level of concurrence across both university and non-university medical faculty that high-fidelity-patient simulators could play a meaningful role in improving medical education.

A frequently proposed solution to many of the obstacles to high-fidelity-patient simulator integration identified by nursing school faculty and nursing education researchers is for collaborative high-fidelity-patient simulator programs to be established with multiple institutions supporting and utilizing a single clinical laboratory (Jansen, et al., 2009; Corbett, et al., 2008; Burgess, 2007). As these proponents of region-wide collaborations have observed, many of the obstacles associated with the high cost of building and maintaining a high-fidelity-patient simulator laboratory, along with the staffing and training issues associated with program implementation, can be greatly ameliorated for individual nurse-training programs if they embark on a cooperative model with other institutions and stakeholders (Reeves, 2006). For example, Waxman and Telles (2009) noted that over 400 nursing faculty and clinical educators from across a range of San Francisco-based medical and academic institutions had been trained through the "Bay Area Simulation Collaborative" program since 2007.

Faculty Satisfaction

A number of recent studies (Hyland & Hawkins, 2009; Gore, et al., 2008) have tracked the experience of student nurses and nurse faculty in working with high-fidelity-patient simulators in the nurse-training programs and found that both teachers and students reported very positive experiences with simulators in the clinical training environment. This view is consistent with Melrose's (2004) report that clinical nursing instructors "value approaches that provide students with the tools to pose and then answer questions themselves" (p. 239). The nursing faculty in Lamontagne, et al. (2008) case study was very supportive of their school's high-fidelity -patient-simulator program. Initial stumbles in regard to providing consistent and clear integration of simulators and clinical education objectives were rectified when faculty and administrators undertook the commitment to devise a comprehensive and structured plan for simulation scenarios. Once this was achieved, faculty reported great satisfaction with both students' evidence of meaningful, active learning, and their own ability to adapt and improve their teaching practice through the use of the simulation program.

The clinical faculty working with nursing students who had experienced a high-fidelity-patient-simulator scenario in the Gore, et al. (2008) study reported that the students were markedly more confident in their clinical practice with real patients than they had been prior to participating in the simulations. The faculty also noted that the simulations provided them with an ideal opportunity to genuinely evaluate nursing students' strengths and weaknesses in that they could "assess and evaluate the critical thinking and psychomotor skills of students prior to actual patient contact," and that they could make better informed patient assignment decisions as the students embarked on the clinical rotation stage of their training (p.61).

Student Experience and Perceptions of Instructors

Melrose (2004) and Sayles and Shelton (2005) noted studies demonstrating that nursing students tend to cite certain consistent characteristics for the effective clinical instructors in their training experience. In addition to being identified as knowledgeable experts in their field, the instructors who maintained positive and collaborative exchanges with students were highly valued. These instructors often encouraged open dialogue with students and made themselves available to address students' questions and concerns. Humanistic and positivist attitudes were also valued by students, as were instructors who readily modeled professional behaviors.

Student Experience and Perceptions of Simulators

In their study of pediatric nursing students working with high-fidelity-patient simulators, Butler, et al. (2009) found that the students perceived that their training with simulators produced more active learning on their part, and helped bridge the gap between their educational practice and their clinical understanding. They reported a difference in student perception based on whether students worked with a high-fidelity simulator or a low-fidelity static model: 100% of the high-fidelity students opted for highest Likert-scale rating of "strongly agreed" that their active learning using the high-fidelity model made their learning experience "more productive". Conversely, 63% of the low-fidelity students "strongly agreed" that their learning was more productive using the simulator. Both groups of students perceived that the simulation experiences (high and low fidelity) provided diverse learning opportunities and that this was a particularly beneficial aspect of the training experience.

The nursing students participating in Springfield Tech's SimMan® program discussed earlier identified the learning benefits of feedback and debriefing as central to their knowledge

gains. Referencing a student error that had occurred during a simulation scenario, the student framed the value of the debriefing thusly: “This was important that you let us fumble with this while the scenario was going on and then we talked about it. It makes more sense now how to do this” (Lamontagne, et al., 2008, p.40). The students appreciated the ability to go back into the simulated condition and repeat the exercise in order to get it right; this, of course, is an opportunity that is largely unavailable in clinical practice with real patients.

Student Satisfaction

There is overwhelming support for the argument that high-fidelity-patient simulators are favorably received by nursing students and that, frequently, these students identify confidence-building and active learning opportunities as salient features of their satisfaction with simulator scenarios (Kardong-Edgren, et al., 2009). The nursing students surveyed in Alinier et al, (2006) study were somewhat atypical in producing a finding that there was little difference between the anxiety and confidence levels expressed by those who participated in simulation scenarios, versus those students who did not, however the simulation students averaged a statistically significant higher score on their clinical examinations following their scenario experiences using an intermediate-fidelity versus high-fidelity-patient simulator. Bruce et al. (2009) similarly found that post-simulation confidence levels for the nursing students in their analysis were not significantly higher than they were prior to the simulation intervention, however the students reported high satisfaction levels with the simulation scenarios they experienced and the researchers contended that the nursing students developed greater skills knowledge and competence in providing evidence-based treatment through the simulation scenario and the debriefing that followed.

In a study of junior nursing students experience using the SimMan model in their training Herm, et al. (2007) observed that while student satisfaction with the high-fidelity-patient simulator was great, the researchers cautioned that student satisfaction must be considered but one of several significant evaluation factors. The fact that students overwhelmingly expressed satisfaction with the experience, despite a portion of the students actually demonstrating significant weakness in their practical responses to the simulation's challenges, was of some concern to these researchers. They urged that a body of empirical research examining the relationship between student cognitions and experience with simulators is required before the effectiveness of high-fidelity-patient simulators for impacting nursing students' professional practice in actual clinical settings can be truly determined.

Kuznar (2007) and Burgess (2007) reported on two of the relatively rare studies looking at high-fidelity-patient simulators for use in populations of associate nursing students. As both researchers observed, most of the research on high-fidelity-patient simulations in nurse education concentrated on baccalaureate and graduate nursing education programs. One reason for this may be that associate nursing degree programs are often realized with smaller budgets and fewer resources then are available to baccalaureate and graduate degree nursing programs, limiting access to more sophisticated and costly training models (such as high-fidelity mannequins). Kuznar (2007) study of associated degree nursing students' experience with a structured high-fidelity-patient-simulation scenario revealed students were highly satisfied with the experience and expressed that the simulation scenario increased their confidence and they perceived that their critical thinking abilities had been enhanced through the learning opportunity with the simulator.

The significant evidence that student nurses strongly and favorably respond to simulation activities (Butler, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009) is borne out by Blunt's (2008) description of an extremely low-tech variation on patient simulation. The researcher noted that the time and resources to devote to instructing nursing students in the conduct of minor, but commonly required, procedures (e.g. toe-nail removal or subingual hematoma release) are limited. Blunt observed that some programs have employed a piece of hotdog with a fake nail attached to simulate a human toe so students could practice these processes without worrying about practicing on a live (and perhaps, wincing) human being and at a cost of approximately $1.00 per student. Despite the craft-class quality of this approach, in fact, student nurses have expressed high levels of satisfaction with such efforts, noting they realized a feeling of accomplishment, and the attendant confidence-building that came with successfully performing the procedure(s). If a portion of hot-dog and a fake nail can prompt a high degree of engagement, satisfaction, and confidence in nursing students, one might surmise that a high-fidelity high-fidelity-patient simulator would offer a truly worthwhile and stimulating learning modality for nursing students.

Summary

The research into the use of high-fidelity-patient simulators in nursing education is still in its early stages and there are a number of questions that have not been definitively addressed (Alinier, et al., 2006). This literature review suggested that several of the research questions this study explores, whether there is relationship between teaching practices related to simulation scenarios and nursing student satisfaction with a simulator programs, and whether simulation design features related to specific forms of student learning are impacted by teaching practices or

have a relationship to student satisfaction, have received little empirical analysis. In terms of student population considerations, Burgess (2007) stated that the use of high fidelity simulators in programs geared toward students pursuing associate nursing degrees is another area that merits further study Kerr (2003) also supported the conclusion.

Several of the recent articles reviewed here suggested that clinical practice with high-fidelity-patient-simulator scenarios produce experiential (active) learning opportunities that may be very appealing across a range of student nurse learning styles (Como, et al., 2009; Fountain & Alfred, 2009; Salamonson, et al., 2009; Bremner, et al., 2008; Amerson, 2006; Reeves, 2006; Sayles & Shelton, 2005; Melrose, 2004). What has not been clearly established through the empirical research thus far is whether high-fidelity-patient-simulator experiences can improve student nurses' critical thinking ability. Some researchers suggest the potential for simulator models to enhance critical thinking (Ackermann, 2009; Butler, et al., 2009; Mauro, 2009; Lamontagne, et al., 2008; Schaefer & Zygmont, 2003) although Brown and Chronister (2009) reported a recent study showing that nursing students engaged in an electrocardiogram simulation using a mannequin performed no better on critical thinking assessments following the simulation scenario activity, than did nursing student peers who were not exposed to the simulation.

The relatively scant amount of research exploring the impact of faculty training in (Butler, et al., 2009; Hyland & Hawkins, 2009; Smith & Roehrs, 2009), and perceptions of (Bray, et al., 2009; Jansen, et al., 2009; Childs, et al., 2007; Murray, et al., 2006), nursing education programs utilizing high-fidelity-patient simulators underscores the need for greater research inquiry into these factors. What seems to be solidly demonstrated throughout much of the literature considering high-fidelity-patient-simulator scenarios in nursing education is that student nurses (as noted above, these would be almost exclusively baccalaureate and graduate

degree nursing students) reported consistently high levels of satisfaction with their simulation scenario activities (Bruce, et al., 2009; Butler, et al., 2009; Kardong-Edgren, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009; Blunt, 2008; Burgess, 2007; Herm, et al., 2007; Kuznar, 2007).

It was the purpose of this study to determine if there is a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses. The review of the literatures supported this purpose.

CHAPTER THREE

METHODOLOGY

Introduction

It was the purpose of this study to determine if there is a relationship between student satisfaction in learning with high-fidelity-patient simulation experience and self-confidence among student nurses. The following research question and hypothesis were tested

Q_1: Is there a statistically significant relationship between student satisfaction with high-fidelity- patient simulation experience and self-confidence among student nurses?

H_1: There is a statistically significant positive relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses.

This chapter will describe the research method and design, the population studied, the instruments used, data collection procedures, statistical analysis, assumptions, limitations, delimitations, and ethical assurances.

Research Design

The research design was a quantitative study that used descriptive statistics to interpret the data collected from the questionnaires. The data were collected from the students enrolled in the course sections being taught by the researcher. The questionnaires were distributed to the students upon completion of the course after they received the course grade. The grades were given so the students were assured that their choice to participate or not was not tied to the course grade. The questionnaires were reviewed with the students, to clarify they were

evaluating the simulation experience and not evaluating the faculty. Consent to participate was the voluntary completion of the questionnaire. The researcher was not in the room when the questionnaires were completed. There were two envelopes one for each survey tool the demographic information could not be associated to the student satisfaction and self-confidence survey.

Research Methodology

The process included Institutional Review Board permissions from all concerned entities. Prospective participants were not contacted until institutional permissions was granted. Ethical issues related to protection from harm, informed consent, right to privacy, and honesty with professional colleagues will be addressed.

Approval was received from Institutional Review Boards from both the University of Houston (Appendix B) and The University of Texas at Brownsville and Texas Southmost College (Appendix C) before data were collected. The evaluation tools were developed by the National League of Nursing and Laerdal, and permission was obtained from the National League of Nursing (Appendix D) to use the tools in the study. Obtaining approval from the two Universities and the National League of Nursing assured that the study met standards of legality and propriety. The researcher also completed the CITI Collaborative Institutional Training Initiative on Human Research Curriculum on Social and Behavioral Research Investigators and Key Personnel a requirement of The University of Texas at Brownsville and Texas Southmost College prior to conducting research. The study began after obtaining permission to conduct the research at the university.

Participants

The University of Texas at Brownsville and Texas Southmost College is located in the southern part of Texas along the Mexico border; the campus is two blocks from the Mexico. It is a unique campus as it is collaboration of a State University with a local Community College. Students can enroll and graduate with a certificate in an area of study and without changing schools or re-enrolling can continue their education and graduate with an Associate, Bachelors or Masters degree and in some areas that have a collaborative program with a Doctoral from the collaborative institution.

The sample used (N=20) there were and consisted of predominantly Hispanics (n=17) and Asians (n=3) there were males (n=3) and females (n=17). The ages ranged from 21 years old to 48 years old with a mean age of 29.9 years. The educational background varied from eleven students who had just the program prerequisites (n=11), technical certificate (n=1), associate degree (n=6), a masters degree (n=1) and doctoral degree (n=1). The degrees were in areas other than nursing. Eight of the students were single, seven were married and five were divorced. The demographics are summarized in Table 3.1 Student Age Summary and Table 3.2 Student Demographics.

Table 3.1 Student Age Summary (N=20)

Student Age Summary		
Range	Mean	SD
21-48 years	29.9 years	10.3

Table 3.2 Student Demographics (N=20)

Gender	Race Ethnicity	Marital Status	Previous Ed.
Male 3	Hispanic 17	Single 8	Pre-Req Only 11
Female 17	Asian 3	Married 7	Technical 1
		Divorced 5	Associate 6
			Masters 1
			Doctoral 1

Program Requirements

Prior to acceptance into the Associate-degree nursing program, students are required to meet the pre-requisites Anatomy and Physiology I and II with lab, College Algebra or Math for Liberal Arts and Introduction to Psychology. The following course descriptions were taken from the University of Texas and Texas Southmost College (2010) Course Catalogue.

First Semester Courses

Dosage Calculations include reading, interpreting and solving calculation problems encountered in the preparation of medications. This includes conversion of measurements within the apothecary, avoirdupois, and metric system.

Nursing Skills Study of the concepts and principles essential for demonstrating competence in the performance of nursing procedures. Topics include knowledge, judgment, skills and professional values within a legal/ethical framework.

Health Assessment: Development in skills and techniques required for a comprehensive health assessment across the lifespan. Designed for students and beginning practitioners. Includes theory and skills necessary to collect a comprehensive health history and to perform and record a complete health assessment.

Introduction to Nursing this course offers an overview of nursing and the role of the professional nurse as provider of care, coordinator of care and member of the profession. Topics include knowledge, judgment, skills and professional values within legal/ethical framework.

Clinical Nursing RN: Foundations for Nursing Practice: This course provides opportunities for the Level I student to practice knowledge and skills being developed in RNSG 1205, RNSG 1215, and RNSG 1413 primarily in the care of well adults and adults with common health care needs in outpatient, long-term care and/or acute care settings. Emphasis is in developing the beginning student's competencies in critical thinking, communication, therapeutic nursing interventions and use of the nursing process within the role of provider of care. The student is introduced to aspects of the nurse's role as a coordinator of care and member of the nursing profession.

Second Semester Courses

Introduction to Community-Based Nursing Overview of the delivery of nursing care in a variety of community-based setting application of systematic problem-solving processes and critical thinking skills, focusing on the examination of concepts and theories relevant to community-based nursing and development of judgment, skills, and professional values within legal/ethical framework

Pharmacology: Introduction to the science of pharmacology with emphasis on the actions, interactions, adverse effects, and nursing implications of each drug classification. Topics include the roles and responsibilities of the nurse in safe administration of medication within a legal/ethical framework.

Principles of Clinical Decision Making: Examination of selected principles related to the continued development of the professional nurse as a provider of care, coordinator of care,

and member of a profession. Emphasis on clinical decision making for clients in medical-surgical settings experiencing health problems involving fluid and electrolytes; perioperative care; pain; respiratory disorders; cardiac and peripheral vascular disorders; immunologic disorders; and infectious disorders. Discussion of knowledge, judgment, skills, and professional values within a legal/ethical framework.

Concepts of Clinical Decision Making: Integration of previous knowledge and skills into the continued development of the professional nurse as a provider of care, coordinator of care, and member of a profession. Emphasis on clinical decision-making for clients in medical-surgical settings experiencing health problems involving gastrointestinal disorders, endocrine and metabolic disorders, reproductive and sexual disorders, musculoskeletal disorders, eye-ear-nose-throat disorders and integumentary disorders. Discussion of knowledge, judgment, skills, and professional values within a legal/ethical framework.

Clinical: Nursing RN Principles and Concepts of Clinical Decision-Making A health-related work-based learning experience that enables the student to apply specialized occupational theory, skills, and concepts. Direct supervision is provided by the clinical professional.

At the time of the study there were 64 students enrolled in the second semester of the Associate-degree-nursing Program. The registration process was the students received a list of courses available, time, date, location and faculty teaching that section. The next step required the students to see meet with their faculty advisor and be cleared to register, once the student has been cleared they number their preference for Clinical RN: Clinical Decision Making had several sections. At The University of Texas at Brownsville/Texas Southmost College, students are able to enroll in courses on-line. This is not true of nursing courses which are not available online. This ensures that only the students who are enrolled in the nursing program are enrolled and this

is done by the department secretaries. The Texas Board of Nursing only allows each faculty to have ten students in the clinical unless there is a second instructor, and then they are allowed fifteen students.

The first twenty students that enrolled into this researcher's two sections of the course participated in the study. The researcher did not have any input as to who was enrolled in either of the two sections.

64students $\rightarrow N \rightarrow X \rightarrow O_1 + O_2$

N = 20 students, X = simulation treatment O_1 = student satisfaction and O_2 = student self-confidence.

Development of the Curriculum

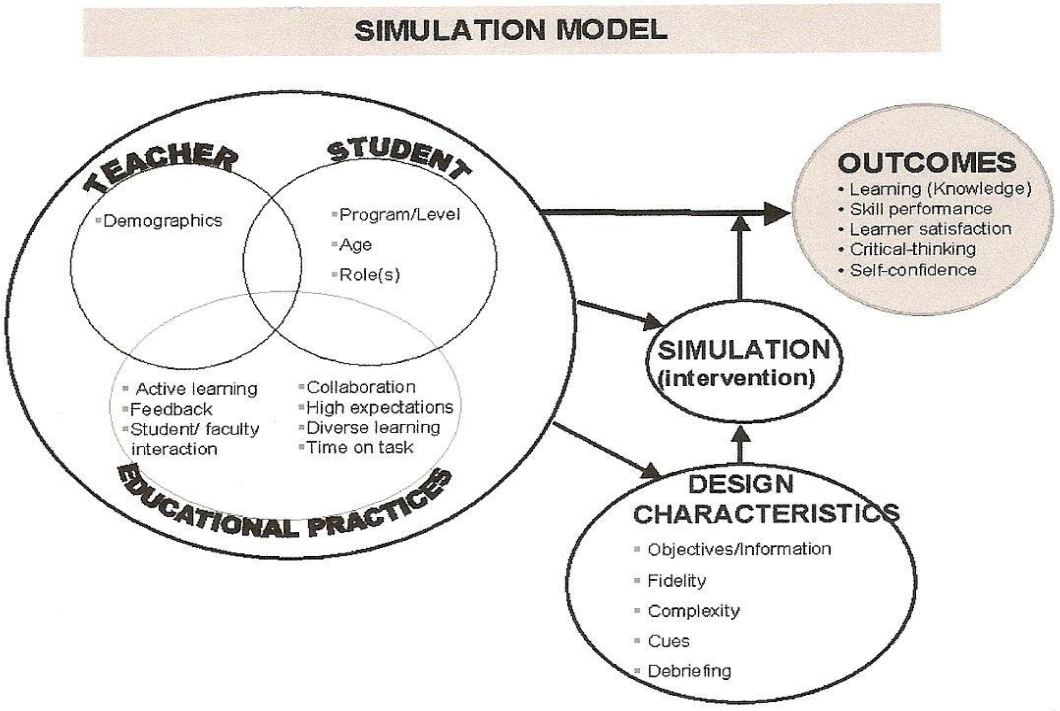
The researcher created the semester's simulations which followed three criteria 1) the research findings that have emerged over the past 25 years which are summarized in Table 1.1. The second was the Simulation Curriculum Matrix and the Nursing Education Simulation Framework figure 3.1. These were developed by Laerdal, The National League of Nursing and Pamela Jeffries, Ph.D., RN,FAAN.ANEF (2007). This simulation model is a consistent and empirically supported model to guide the design and implementation and evaluations of simulations. (Simmulation Innovation Recourse Center 2011). The framework consists of five components, 1) Teacher factors, 2) Student factors, 3) Educational practices, 4) Design factors and 5) Outcomes. The design characteristics include five variables, 1) clear objectives and information, 2) support, 3) suitable problem, 4) feedback and 5) realism of the scenario. The third criteria was the comparisons of learning outcomes Table 3.3 for the University of Texas at Brownsville/Texas Southmost College and the Texas Board of Nursing.

The researcher developed four sessions that focused a Lower Leg Fracture (1) Pain Assessment and Application of Ice Packs, (2) Pre-Operative Assessment, (3) Post-Operative Assessment and (4) Shortness of Breath.

Forms that were included in the simulation were, Simulation Scenario – Development Worksheet for Faculty, Table 3.4. Student Activities for Simulation Table 3.5, and Patient Chart Information Table 3.6.

For the simulation with the high-fidelity-patient simulator, there were five students at a time in the scenario and they randomly chose roles. The researcher kept track of the roles so that the students had the opportunity to experience all roles. The Description of Student Roles are defined in Table 3.7.

Figure 3.1 Nursing Education Simulation Model



IN P.R.Jeffries (2007) Simulatiuon in nursing education:From conceptualization to evaluation.NY: National League for Nursing

Reprinted with approval from the National League of Nursing. (appendix A)

Table 3.3 Comparison of Learning Outcomes

End of Course outcomes UTB/TSC	Scope of Practice as defined by the Texas Board of Nursing http://www.bne.state.tx.us/practice/pdfs/scope-of-practice.pdf
Provider of Care Refine assessment skills guided by biological and psychosocial theories to identify the physical needs of individual adult clients with common health problems and the social, spiritual, cultural and health education needs of the client and his/her family based on collected data. Differentiate normal from abnormal assessment data collected including laboratory and diagnostic findings. Use the nursing process as a critical thinking tool to meet the needs of the client and his/her family experiencing common health problems. Improve the performance of basic nursing skills along with performing additional skills to provide safe, caring, therapeutic, culturally sensitive nursing interventions to individual clients and their families with common health problems according to nursing standards of practice. Use effective communication skills to interact with individual clients and their families.	. **Provider of Care:** (a) Determine the predictable or unpredictable health status and health needs of clients (individual and family) through interpretation of health data and preventive health practice in collaboration with clients and interdisciplinary health care team members. (b) Utilize a systematic approach to provide individualized, goal-directed nursing care by: (i) Performing comprehensive nursing assessments regarding the health status of the client(s); (ii) Formulating a nursing care plan based on determination of nursing diagnoses; (iii) Implementing nursing care within the RN's scope of practice, including compliance with other laws are applicable to the RN's practice setting; (vii) Utilize a critical thinking approach to analyze clinical data and current literature as a basis for decision making in nursing practice.
Coordinator of Care Practice applying principles of leadership and management with a team of peers to accomplish care goals. Practice effective communication techniques to collaborate with other members of the health care team to provide quality health care and insure continuity of care for an adult client with common health care needs. Identify support services in the institution and/or community that will assist in meeting the health care needs of an adult client and his/her family.	**Coordinator of Care:** Make assignments to licensed staff- (LVNs, RNs) and delegate to unlicensed staff- in compliance with current BON rules in both structured and unstructured health settings for clients with predictable as well as unpredictable health needs.
Member of a Profession Assume responsibility as an advocate for the adult client/family with common health care needs. Display respect and support for the values and beliefs of adult clients and their families. Assume responsibility for professional conduct and accountability for his/her own actions in the care of the client.	. **Member of a Profession:** (a) Performing comprehensive nursing assessment regarding the health status of the client(s); (b) Formulating a nursing care plan based on determination of nursing diagnoses; (c) Developing and implementing teaching plans for clients concerning promotion, maintenance and restoration of health; (d) Providing for the care of multiple clients (individual and family) either through direct care or assignment and/or delegation of care to other members of the health care team.

Table 3.4 Simulation Scenarios – Development Worksheet for Faculty

Simulation Title: Lower Leg Fracture **Course:**
Expected Simulation Run Time: 20minutes **Debrief Time:** 20minutes
Number of Students & Faculty Participating: 5 &1
Simulation Learning Objectives:

1. Perform physical assessment and vital signs in a safe and organized manner.
2. Identify Primary Nursing Diagnosis
3. Implements patient safety measures
4. Demonstrates effective teamwork
5. Implements direct communication
6. Prioritizes and Implements Physician Orders Properly

Psychomotor skills required prior to simulation	**Cognitive skills required prior to simulation**
▪ Vital Signs ▪ Physical assessment ▪ Pain Assessment ▪ Receiving report ▪	▪ Standard precautions ▪ Communication skills ▪ Clinical prioritization skills ▪ Medication administration principles

Cognitive skills learned during simulation
▪ Application of cold devices ▪ PO Medication Administration ▪ Pain Assessment

Table 3.5 Student Activities for Simulation

Time	Student Intervention	Instructor Intervention (including prompts)
5 to 10 minutes	~ obtain nurses report ~ wash hands ~ introduce self to patient ~ identify patient (check armband) ~ obtain vital signs ▪ Verbalize findings to instructor ~ initial assessment ▪ Verbalize findings to instructor	~ student will perform vital signs & physical assessment ▪ Student will verbalize findings o If incorrect, ask student to repeat o If correct, ask student to continue ~ Vital Sign findings: ▪ **BP:** 160/94 ▪ **HR:** 100 ▪ **RR:** 28 ▪ **SpO2:** 96% RA ▪ **Temp:** 98.6 (O) ▪ **Pain:** 4/5 ~ Physical assessment findings: ▪ **Neuro:** awake, alert, oriented ▪ **Resp:** B clear breath sounds, ▪ **Cardio:** S1S2 present, no murmur, weak thready pulse ▪ **Abdomen:** bowel sounds present, no pain or distention ▪ **Skin:** warm and dry, wound to right lower leg
10 minutes	~ analyze assessment findings & suggest appropriate treatment ~ assess allergies ~ administer medication ▪ Verbalize 7 rights ▪ Demonstrate 3 medication checks	~ Appropriate treatment ▪ IV NS 125 ml/hour ▪ Elevate lower extremity ▪ Apply Ice ▪ Administer pain medication ~ Medication rights ▪ Right medication ▪ Right client ▪ Right dosage ▪ Right route ▪ Right time ▪ Right documentation ▪ Right evaluation ~ 3 medication checks ▪ Before removing the container from the drawer or shelf ▪ As the amount of medication ordered is removed from container ▪ Checked before opening at the client's bedside ~ Obtain VS after 15 minutes & assess for allergic reaction
5 min	~ identify evaluative findings	~ decreased pain ~ stable vital signs
15 min	Debriefing	Debriefing
30 min	Reflective journaling	~ Describe how your personal values & beliefs influenced your actions during this experience ~ Describe how this experience could have been handled differently.

Table 3.6 Patient Chart Information

Admission Date: 9/6/08 **Today's Date:** 9/6/08 **Brief Description of Patient** **Name:** C.A.. **Gender:** M **Age:**18 **Race: W** **Weight:** 88.8 **kg** **Height:** 6'2" **Religion:**Unkn **Major Support:** Single, lives at home **Allergies:** NKDA, Pen **Immunizations:** < 5 years **Attending Physician/Team:** Dr. Smith **Past Medical History:** None **Past Surgical History:** None **History of Present Illness:** The client is a 18 year old male who arrived to the emergency department with complaints of pain to his right lower leg after he fell while using his skate board. **Social History:** Denies	**Primary Diagnosis:** Lower leg Pain **Surgeries/Procedures:** none **Significant Diagnostic Results:** ▪ Fracture Right Lower Leg ▪ Chest X-Ray Clear **Physician Orders:** ▪ IV NS at 125 ml/hr ▪ Chest X-Ray ▪ X-Ray Right Lower Leg ▪ Patient NPO ▪ H&H ▪ Tylenol 650mg P.O. every 4 hours ▪ Glucometer AC/HS sliding scale 1

Table 3.7 Description of Student Roles

Charge Nurse	Assessment	Medication	Recorder	Parent/Family/Friend
Directs activities of other roles, gathers appropriate findings, articulates priority nursing diagnosis, interventions and goals	Responsible for conducting and articulating physical assessment findings	Responsible for administering medications according to institutional policies and procedures, National Patient Safety Standards	Documents what the roles have done as they are reported	Plays the role of the patients "next of kin" Answers questions directed by interviewer. Interacts with "patient" Provides cues to the students.

The spring semester lasted 15 weeks with 13 weeks for class time. The class time was eight hours once a week. The clinical was offset with 30% simulation experience, which met four times during the semester. The program director and the department chair established that one hour of simulation was the equivalent of two hours of clinical time in the hospital.

The role of the researcher was that of a guide. If the students got off track or appeared to be confused, the researcher asked probing questions, playing the role of the hospital nurses who would call for order clarification, additional orders or other aspects of the scenario.

The students used high-fidelity-patient-simulator scenarios that were developed based using the objectives that were to be taught that day. An example outline is shown in Table 3.4 Student Activities for Simulation. Students received the following report from the researcher before the simulation: "The client is an 18-year-old male who arrived to the emergency department with complaints of pain to his right lower leg after he fell while using his skate board."

If there was a new skill to be taught, the researcher presented the skill, the purpose, nursing considerations, and potential risk to the patient. The researcher then demonstrated the skill and allowed the students time to practice. Prior to attending the clinical-simulation lab, the

students were given the patient's disease diagnosis and any medications and laboratory values they must know to care for the patient.

Simulation Experience

Day One

Report to Charge Nurse from Paramedics

Christopher Allen is an 18 year old male, tried to jump a curb on his skate board and fell off. Complaints of pain and numbness to his right ankle, pedal pulse is present. Vital signs BP: 160/90, HR: 100, RR: 28, Sp02 96% on RA, Temp: 98.6 (O) and Pain 4/5. No known drug allergies he is accompanied by his mother. "Staff" assumes care and carries out orders written by the emergency room physician. Upon completion report is called to the receiving floor.

Day Two

Report to receiving charge nurse

Christopher Allen, room 123 an 18 year old male patient of Dr. Smith, right ankle fracture, scheduled for open reduction at 11:00 by Dr. Houston, vital signs BP; 124/78, P: 70 R: 16 T; 98.2, glucometer 82 no coverage needed. Is NPO for surgery. NS at 100ml/hr to left forearm with and 18g abbocath. Splint to RLE, medicated with Demerol 50mg IM at 0600.

Day Three

Report to receiving charge nurse from surgery

Christopher Allen, 18 year old male, surgical procedure: open reduction of RLE ankle fracture. VS BP: 110/68, P: 76 R; 12 T; 97.6, pedal pulse strong and regular, capillary refill <3sec. dressing to surgical incision clean dry and intact, splint applied. I.V. NS at 120ml/hr infusing to left forearm. Patient is drowsy but arousable. Dr. Houston has written post-op orders.

Day Four.

Report to receiving charge nurse

Christopher Allen 18 year old male patient of Dr. Smith. One day post-op of open reduction of RLE ankle fracture performed by Dr. Houston. BP 118/72, P: 68 R: 16 T: 99.8. I.V, NS at 80ml/hr infusing to right hand. Glucometer 124 covered with 10units regular insulin at 0630. Patient complaints of shortness of breath, oxygen at 2 liters by nasal cannula. New orders received from Dr. Smith.

After the charge nurse received the report, physician orders were reviewed. Assignments were given to the other "staff". The students then enter the room and performed their assignment and reported the findings to the charge nurse and the recorder for documentation. Students were to introduce themselves to the patient and family members and wash their hands prior to

performing care. If the family member noticed something is not being done, (introduction, washing hands, explaining the care) they would ask the "staff" questions, such as "who are you?", "you don't wash your hands?", "what are you doing and why".

The simulation was student driven, asking questions, developing a nursing diagnosis, prioritizing care. The students also provided care for the family members, reducing anxiety and addressing concerns. Patient and family education was provided. When necessary, the researcher could intervene to take advantage of teaching moments, also provide guidance if the students are off track. At the end of the simulation scenario, there was a debriefing period. It was in the debriefing that the students discuss their experience. How did they feel about the simulation, Stress? What did they learn from the experience? Where do they think their strengths were? What did they think their weaknesses were? During the debriefing the faculty member also gives input on how the students did.

Instruments

The participants were asked to complete a demographic form (Appendix D) and to complete the one of the evaluation tools the student satisfaction and self-confidence survey (Appendix E) a 13-item instrument designed to measure student satisfaction (five questions) with the simulation activity and self-confidence in learning (eight questions) using a five-point scale. Reliability was tested using Cronbach's alpha: satisfaction = 0.94; self-confidence = 0.87. The survey was developed by the National League of Nursing and Laerdal during their three year study. (Jeffries & Rizzolo, 2006).

Data Collection and Analysis

Upon completion of the Concepts and Principles of Clinical Decision Making course and grades were given, the students' anonymity of participation was assured. They were informed that their completion of the data collection instruments constituted their consent for participation in this study.

The surveys were be analyzed using the Pearson Product Moment statistical method. This method was chosen to answer the research question and test the research hypotheses.

Limitations

There were several limitations to the study. First all the participants were volunteers and were enrolled in the researcher's class; therefore the students may not answer the survey honestly. The second limitation was the small size of the study. The Associate Degree Program admitted 80 students in the fall semester, by the spring semester several students had not been successful in the program. At the time of the study there were 64 students in the program; twenty students were enrolled in the researcher's courses. There was also limited computer support, and the researcher was the only faculty who is incorporated simulation into the clinical experience. Therefore only one person was writing the simulation experiences.

Summary

The stated purpose of this study was to determine if there was a relationship between student satisfaction with high-fidelity patient simulation experience and self-confidence among nursing students. The results may contribute to the growing body of knowledge in nursing education.

This chapter described the research method and design, the population studied, the instruments used, data collection procedures, statistical analysis and limitations. The following chapter will describe the results

CHAPTER FOUR

RESULTS

Introduction

The purpose of the study was to determine if there was a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses. The following research question and hypothesis were tested

Q_1: Is there a statistically significant relationship between student satisfaction with high-fidelity- patient simulation experience and self-confidence in learning among student nurses?

H_1: There is a statistically significant positive relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence in learning among student nurses.

The data analyses of the findings are presented in this chapter. Both descriptive and correlation statistics were calculated using the data to answer the research question. This chapter describes the results obtained in written, tabular and graphical form.

Student Satisfaction and Self-confidence

The participants completed instrument containing: the "Student Satisfaction" and "Self-Confidence in Learning." These use a five-point Likert scale for students to rank their opinions, with "Strongly Disagree" valued at 1, "Disagree" valued at 2, and "Undecided" valued at 3, "Agree" valued at 4, and "Strongly Agree" valued at 5. An example of the surveys are shown in appendix E. The results of student responses are shown in Table 4.3 Results of "Student Satisfaction" and "Self-Confidence".

Table 4.3 Results of the "Student Satisfaction" and "Self-Confidence in Learning" surveys

Question	Mean	Percent
Satisfaction		
1. Method was helpful and effective	5.00	100%
2. Provided a variety of materials/activities	4.85	85%
3. Enjoyed how the instructor taught	5.00	100%
4. Materials were motivating	4.80	80%
5. Was suitable to the way I learn	5.00	100%
Self-Confidence		
6. Confident mastering the material	4.85	85%
7. Confident critical content was covered	4.90	90%
8. Confident skills/knowledge being obtained	4.95	95%
9. Instructor was helpful	4.95	95%
10. It is my responsibility to learn from activity	4.95	95%
11. I know where to get help	5.00	100%
12. I know how activities help with critical thinking	4.85	85%
13. It is the instructors responsibility to tell me	4.40	65%

Data Analysis for the Hypotheses

A summary of the raw data of student responses is shown in Table 4.4 Summary of Student Responses. The raw data show that the students scored their responses highly on both the "Student Satisfaction" and the "Self-confidence in Learning" surveys.

Table 4.4 Summary of responses to "Student Satisfaction" and "Self-confidence in Learning" survey

Student	Satisfaction	Self-confidence
1	24	37
2	25	34
3	25	36
4	25	38
5	23	38
6	24	37
7	23	38
8	25	39
9	24	40
10	25	40
11	25	40
12	25	40
13	25	40
14	25	40
15	25	40
16	25	40
17	25	40
18	25	40
19	25	40
20	25	40

These data were analyzed using the statistical program Systat. The means and standard deviations for the data are summarized in Table 4.5 Results of Statistical Analysis. The Pearson product-moment correlation was also calculated to determine the correlation coefficient, determining the strength and the direction of the relationship between student satisfaction and self-confidence and the use of high-fidelity-patient simulations in the course.

Table 4.5 Results of statistical analysis of the survey data

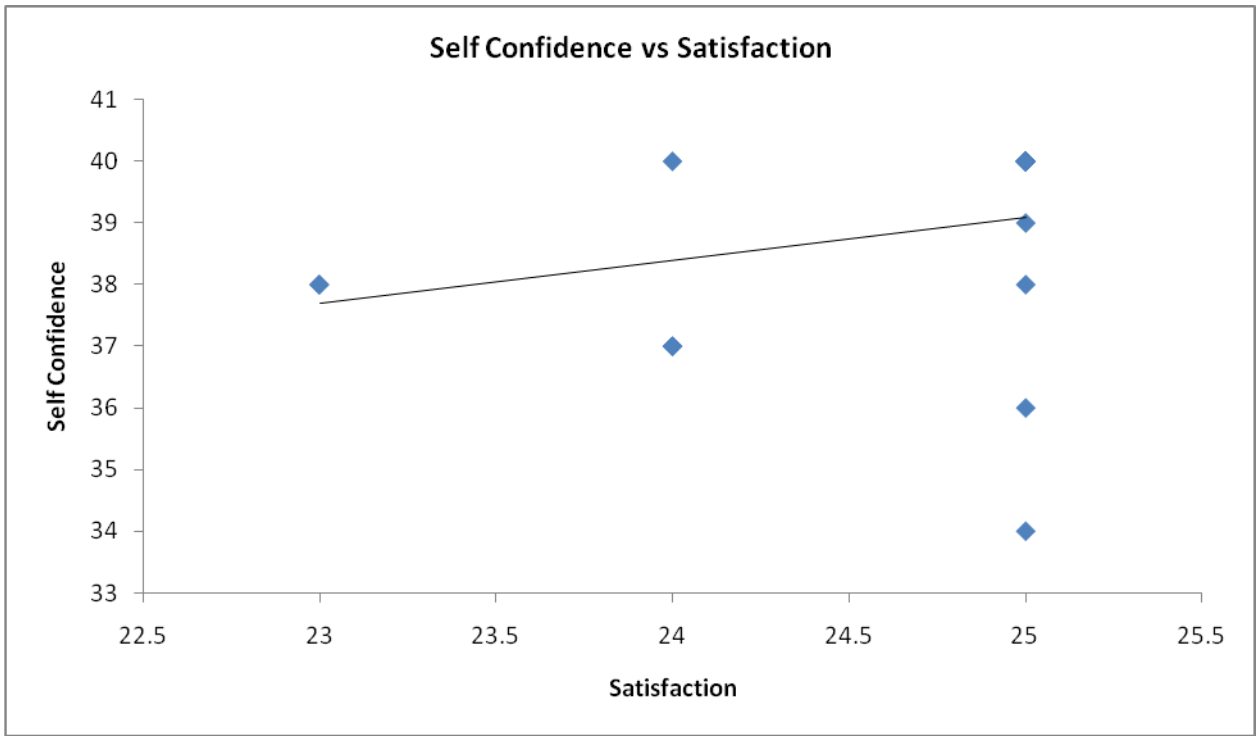
Means and Standard Deviation		
Variable	Means	SD
Satisfaction	24.65	0.670
Self-Confidence	38.85	1.752

Correlation Coefficients		
Variable	r	p
Student Satisfaction	0.271	0.124

Table 4.5 above shows that calculating the Pearson's product-movement correlation yielded a correlation coefficient (r= 0.271) with a weak non-significant, positive correlation (p > .05) between student satisfaction and self-confidence in learning.

Figure 4.1 shows the scatterplot results of the Pearson's product-movement correlation for "Student Satisfaction" and "Self-confidence in Learning" survey responses.

Figure 4.1 Scatterbox of relationship between self-confidence and satisfaction



Summary

The purpose of the proposed study was to determine, through student perceptions, if there was a relationship between satisfaction and self-confidence that is attained through experiencing a researched-based-training element in associate-degree-nursing coursework. The strength and direction of the hypothesis between student satisfaction and self-confidence with the use of simulation was tested.

This chapter represented the results from the data collected from students enrolled in The University of Texas at Brownsville and Texas Southmost College in the medical-surgical courses, Concepts of Clinical Decision Making and Principles of Clinical Decision Making, and the clinical component of the course, Clinical RN: Clinical Decision Making.

The following chapter will discuss the conclusions, interpretations, and implications of data collected in this study.

CHAPTER FIVE

CONCLUSIONS, INTERPRETATIONS, AND IMPLICATIONS

Introduction

The purpose of the study was to determine if there was a relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses.

The question and hypotheses were tested by statistical analysis of student-nurse-survey data to determine the strength and direction of the correlation between the satisfaction and self-confidence of second-semester associate-degree-nursing students. The students surveyed attended The University of Texas at Brownsville and Texas Southmost College and were enrolled in three first-year medical-surgical courses in which high-fidelity-patient-simulation instruction was used: Concepts of Clinical Decision Making, Principles of Clinical Decision Making, and the clinical component of Clinical RN: Clinical Decision Making. The results and analyses of the data collected during the study were provided in the previous chapter. This chapter will discuss the conclusions and interpretations suggested by the data. This chapter ends with a brief statement about the implications for curriculum developers who are using or contemplating using high-fidelity-patient simulations, and the statement also contains suggestions for future research.

Background

After a review of the literature, the researcher detected several themes: critical thinking, confidence building, teamwork, and student satisfaction. The activities performed during the simulations were guided by these findings. The research by Brown and Chronister (2009), Butler, et al. (2009), Mauro (2009), and Lamontagne, et al. (2008) found that students today are active learners and like to be engaged. In the activities, students had to prioritize patient care, develop a nursing diagnosis, and implement and evaluate their plan of care. The second characteristic incorporated was confidence building. During the debriefing, the researcher and students discussed strengths and weaknesses possibilities for improvement. This is supported by the research conducted by Butler, et al. (2009), Leighton and Scholl (2009), Mauro (2009,) Smith and Roehrs (2009), and O'Brien, et al. (2008). Teamwork was researched by Bray, et al. (2009), Waxman and Telles (2009), Corbett, Miles, Gantt, Stephenson and Larson (2008), and Weller, Merry, and Robinson (2008). The students in the simulations had different roles during the simulation, talked to each other about what needed to be done and what had been completed, interacted with family members and collaborated together if they had uncertainty. The last theme was student satisfaction. Research in this area was conducted by Bruce, et al. (20090, Mauro (2009), Smith and Roehrs (2009), Blunt (2008), Burgess (2007), Kuznar (2007), and Alinier et al. (2006).

Several researchers have observed that one of the key findings of high-fidelity-patient-simulation research is that nursing students frequently report it to be a confidence-building experience for them, even when they make errors during their simulation scenarios (Butler, et al., 2009; Mauro, 2009; Smith & Roehrs, 2009).

Smith and Roerhs (2009) conducted a correlational study to determine what factors associated with high-fidelity-patient simulations contributed to positive outcomes such as student satisfaction and self-confidence. They determined that when students were challenged appropriately with specific tasks and when the instructor had identified clear objectives for the scenario, students reported high levels of satisfaction as well as greater self-confidence. They assessed five design elements (objectives, support, problem solving, guided reflection, and fidelity) and found that the five design elements in conjunction caused a significant degree of satisfaction; however, when the design elements were isolated, "objectives" was found to be the main contributor to students' satisfaction. For building self-confidence, all five design elements in conjunction created the most significant impact; however, Smith and Roehrs (2009) observed that "problem solving" appeared to have an individual and positive relationship to self-confidence that the other features, when considered separately, did not.

Conclusions and Implications of the Hypotheses

The research question was and hypotheses tested were:

Q_1: Is there a statistically significant relationship between student satisfaction with high-fidelity- patient simulation experience and self-confidence among student nurses?

H_1: There is a statistically significant positive relationship between student satisfaction with high-fidelity-patient simulation experience and self-confidence among student nurses.

Research by Skiba and Barton (2006) on the use of high-fidelity-patient-simulation instruction noted that generational differences were responsible for a pedagogical disconnect that is frequently seen between students and faculty members, who typically belong to the "Mature"

generation (born 1900-1945) or the “Boomer” generation (1946-1964). While many mature faculty members are now retiring and more “Generation X’ers” (1965-1982) are moving into faculty positions, many of these new faculty members grew up before information technologies had been fully integrated into everyday life. This could be applied to students, who might be changing careers and not be of traditional college age. Student-survey data were collected on the age of the students who participated in the studies, as shown in Table 4.1 Student Age Summary. The demographic data show that the age of the students apparently does not influence students’ satisfaction with current learning or self-confidence in learning.

Studies by Bruce, et al. (2009) determined that the students reported high satisfaction levels with the high-fidelity-patient simulation scenarios they experienced, and the researchers contended that the nursing students developed greater skills, knowledge, and competence in providing evidence-based treatment through the simulation scenario and the debriefing that followed.

For question one, the “Student Satisfaction” survey as shown in Table 4.3 Summary of Student Respones shows that all 20 (100%) students strongly agreed that the simulation was helpful and effective. For question two, 16 (85%) of the students strongly agreed that the learning material and activities promoted learning. For question three there all 20 (100%) strongly agreed enjoyed how the instructor taught. For question four, 16 (80%) of the students strongly agreed the teaching materials were appropriate. For question five, all 20 (100%) of the students strongly agreed that and the use of the human-patient simulation was suitable to the way they learned. These findings demonstrated that the participants reported high levels of satisfaction with high-fidelity-patient-simulation instruction.

The variable, “self-confidence in learning,” was also examined. The responses to the “Self-confidence in Learning” survey are summarized in Table 4.3 Summary of Student Responses. As the data demonstrate, 16 (85%) of the students felt confident in mastering the content of the simulation activity, 18 (90%) of the students felt the simulation covered critical content for the mastery of medical-surgical curriculum, and 19 (95%) of the students felt confident they were obtaining the necessary skills to perform in clinical settings. Student responses to the teaching-related questions showed that 19 (95%) of the students felt the instructor used helpful resources, 19 (95%) of the students felt it was their own responsibility to learn what they need to know, and 20 (100%) of the students felt they have a professional need to understand the concepts covered in the simulation. The students seemed to have difficulty knowing how to use simulations to learn critical aspects.

This difficulty could be related to the fact that students usually learn one skill at a time, for example Foley catheter insertion. In the simulations that were developed the students had to incorporate all the steps of the nursing process, assessment, develop a nursing diagnosis, develop a plan, implement the plan and evaluate the plan. They also had to prioritize what needed to be done based on their assessment, and document all activities. Even with facing the new challenge, 17 (85%) of the students felt that they could learn critical aspects. The last question they were asked was whether it is the instructor’s responsibility to tell them what they need to learn from the simulation activity, and 13 (65%) strongly agreed, five (25%) agreed, one (5%) disagreed, and one (5%) strongly disagreed.

As shown in Table 4.5, Results of Statistical Analysis, the data were analyzed using the Pearson product-moment correlation to identify whether there is a correlation between student

satisfaction and self-confidence in learning. The analysis of the data from the Pearson product-moment correlation yielded a correlation coefficient r= +0.271 and a probability value of p= 0.1243, this value is not statistically significant.

Implications

This study examined the relationship of students' satisfaction and level of self-confidence after experiencing a research-based-training element that included high-fidelity-patient simulators. Its purpose was to contribute to this growing body of knowledge by considering variables that may impact associate-nursing students' satisfaction with curricula utilizing high-fidelity-patient-simulator scenarios and the level of self-confidence that is attained by virtue of simulation instruction.

The results of this study demonstrated that the students' were highly satisfied with the high-fidelity-patient simulation and felt self-confident as a result of the simulation instruction; however, there was a weak, positive correlation between the two variables. There were several factors that could have influenced this result. For example, some of the students might have enjoyed the diverse way of having a clinical experience.

Student Feedback

A follow up questionnaire asking the students about their experience with simulation was sent to all the students who participated in the study, of the twenty students who participated in the simulation study, four students responded.

1. How did you feel about the design of the clinical simulation experience compared to the hospital clinical experience?

a. I felt the setting was appropriate and useful because it gave us a chance to practice our skills without having the pressure of the real hospital setting.

b. It was a great opportunity for to get more practice done. It helps with the anxiety of doing things for the first time. It is a reassurance to myself knowing I have done it and been successful during simulation.

c. The simulation was a good experience, was able to do things that are not available in the hospital.

d. I found it very helpful, organizing with the other students, having to think fast because it was not known how the family member would respond to the questions.

2. Did you feel that the clinical simulation teaching was the same, better, or not as good as the hospital clinical teaching experience?

a. I feel they were both good. The hospital provided for real experience, while the simulation lab help prepare, reinforce, and assess our knowledge.

b. if possible, I would love to have the rest of my clinical with at least some simulation. It's one foot in the door when we do have hospital clinical. I think they complement each other.

c. Both experiences are good, the simulation was helpful in getting use to asking questions to both the patient and family. Was very helpful with practicing documentation.

d. The simulation was useful because I was doing more than one thing at a time, like in the hospital.

3. Do you feel that the clinical simulation experience increased your understanding of patient diagnosis and treatment (putting it all together)?

a. Yes it did. This was due to the help from our professor and peers to help add to the knowledge we already had.

b. yes. I felt more comfortable asking questions and therefore bettered my understanding of patient situations. The environment was very helpful.

c. yes it did, to assess the patient, and prioritize all the care, and looking at all the possible nursing diagnosis.

d. Yes it did, I wish we could have had more of them.

4. Do you feel that the clinical simulation experience increased your level of competence and confidence in the hospital experience?

a. Clinical simulation did increase my competence and confidence of the hospital experience. For instance, we practice IV administration and procedure right before doing it at the hospital as well as many other procedures that require practice and supervision. Practicing helped us with the fears of making mistakes.

b. Yes, definitely

c. Yes, I felt more confident about my skills.

d. Yes, I enjoyed it, working as a team with the other students helping each other.

5. Do you feel that the clinical simulation experience contributed to improvement in critical thinking?

a. no response
b. yes, it was practice for real life situations with real results
c. yes, because the patient condition would change, what needed to be done first.
d. no response.

Summary of the Study

One of the major purposes of correlational research is to clarify the understanding of important factors through the relationship between two variables. This was especially important in education, where an experimental design might be difficult to conduct due students' legal and policy protections. Although the discovery of a correlational relationship does not establish a casual connection, there is usually an attempt by the researcher to gain some idea of cause and effect.

Because patients in the hospital have a higher acuity and often shorter stays, nursing students need to complete their professional training better prepared to deliver competent, quality patient care. Nursing graduates need skills but also self-confidence, and the ability to communicate and think critically. Students need to trust that the high-fidelity-patient-simulation training has prepared them for the challenges they will face in real-life clinical settings, whether they are simple or complex nursing tasks. Fortunately, high-fidelity-patient simulations can be

adapted to many scenarios, from recognizing changes in vital signs to situations as complex as treating cardiac arrest.

When developing a scenario, it was important that the students have a clear understanding of the learning objectives. The more realistic the scenario, the more it replicates what is in the hospital, the more beneficial the experience is to the students.

Recommendations for Further Research

Based on the results of this study, the researcher offers following recommendations for further study:

- This study should be replicated in other nursing-school populations at various levels.
- This study should be used to follow students from the first day of their nursing-school career to graduation to see if there is any change.
- This study should be replicated using other instruments to see if there is a stronger relationship between student satisfaction and self-confidence.
- A qualitative study should be conducted to examine the level of student satisfaction with the form of learning and why they feel it increased their self-confidence.
- A follow up study should be conducted with the students who are now registered nurses to examine whether or not the use of simulation was helpful in the transition into that role.

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APPENDIX A

NATIONAL LEAGUE OF NURSING APPROVAL FROM

National League for Nursing

June 29, 2009

Suzanne V. Dougherty, RN, MSPHN
Assistant Professor
Associate Degree Nursing Program
University of Texas at Brownsville &
Texas Southmost College
Dear Ms. Dougherty:

I am writing in response to your e-mail, in which you request permission to use a figure from an NLN publication as the conceptual framework for your dissertation on simulation. I am sorry that you did not receive a reply to your initial request, and I'm at a loss to explain why that happened. But I am pleased to approve your request and grant permission for the following:

The figure, "The Nursing Education Simulation Framework," which appears as Figure 3-1 on page 23 in the book noted below, may be included in your dissertation.

Jeffries, P.R. (Ed.). (2007). Simulation ***in nursing education: From conceptualization to evaluation***. New York: National League for Nursing Press.

In granting permission to include the figure noted above, it is understood that the following assumptions operate and "caveats" will be respected:

- The figure will be included only in the report of your dissertation
- The figure will not be modified in any way
- The report in which this figure appears will acknowledge that it has been included with the permission of the National League for Nursing, New York, NY
- No fees are being charged for this copyright permission
- The National League for Nursing owns these rights being granted

I am pleased that material published by the NLN is seen as valuable, and I'm pleased that we are able to grant permission for its use. Please call me ***(212-812-0329)*** with any questions about items noted in this letter. Thank you.

Most sincerely,

Linda S. Christensen, JD, MSN, R

APPENDIX B

APPROVAL FROM THE COMMITTEE FOR THE

PROTECTION OF HUMAN SUBJECTS

UNIVERSITY OF HOUSTON

UNIVERSITY of HOUSTON

COMMITTEES FOR THE PROTECTION OF HUMAN SUBJECTS

May 18, 2009

Ms. Suzanne Dougherty
c/o Dr. Howard L. Jones
Curriculum and Instruction

Dear Ms. Dougherty:

Based upon your request for exempt status, an administrative review of your research proposal entitled 'Perceptions of First Year Associate Degree Nursing Students' on April 20, 2009, according to institutional guidelines.

At that time, your request for **exemption under category 4** was approved pending modification of your proposed procedures/documents.

The changes you have made adequately respond to those contingencies. As long as you continue this project using procedures described in this project, you do not have to reapply for review.* Any modification of this approved protocol will require review and approval. Please contact me to ascertain the appropriate mechanism.

If you have any questions, please contact Alicia Vargas at (713) 743-9215.

Sincerely yours,

Christopher R. Smith, CHC
Director of Research Compliance

*Approvals for exempt protocols will be valid for 5 years beyond the approval date. Approval for this project will expire **April 1, 2014**. If the project is completed prior to this date, a final report should be filed to close the protocol. If the project will continue after this date, you will need to reapply for approval if you wish to avoid an interruption of your data collection.

Protocol Number: 09255-EX

316 E Cullen Building • Houston, TX 77204-2015 • 713/743-9204 • Fax: 713/743-9227

APPENDIX C

APPROVAL FROM THE COMMITTEE FOR THE

PROTECTION OF HUMAN SUBJECTS

UNIVERSITY OF TEXAS AT BROWNSVILLE

AND

TEXAS SOUTHMOST COLLEGE

SPONSORED PROGRAMS
THE UNIVERSITY OF TEXAS AT BROWNSVILLE and TEXAS SOUTHMOST COLLEGE
80 Fort Brown · Brownsville, Texas 78520 · (956) 882-7849 · Fax (956) 882-7851

April 16, 2009

Suzanne Dougherty - Principal Investigator
Nursing
University of Texas at Brownsville and Texas Southmost College
80 Fort Brown, LHSB 2.708
Brownsville, Texas 78520

RE: IRB-HS Approval

Study Title: "Clinical Simulation: Perceptions of First Year Associate Degree Nursing Students (FKA – Offsetting Clinical Time in Border Hospitals through Simulation to Increase Capacity)"

Protocol #: 2008-024-IRB

Approval Type:
☐ Full Board Review
☐ Designated Member Review
☐ Continuing Review
☒ Change Request/Modification/Amendment
☐ Exempt Cat. 1 2 3 4 5 6
☐ Expedited Cat. 1 2 3 4 5 6 7 8 9

Approval Period:

Start Date: 7/25/08 End Date: 7/01/09

Dear Ms. Dougherty,

In accordance with Federal Regulations for review of research protocols, the Institutional Review Board – Human Subjects of the University of Texas at Brownsville and Texas Southmost College have reviewed your study as requested.

The IRB-HS grants its approval for this project contingent on compliance with the following items. You may make as many copies of the stamped consent form as are necessary for your activity. All consent forms MUST bear the UTB/TSC IRB stamp indicating approval.

Responsibilities of the Principal Investigator also include:

- **Inform the IRB-HS in writing immediately of any emergent problems or proposed changes.**
- **Do not proceed with the research until any problems have been resolved and the IRB-HS have reviewed and approved any changes.**
- **Report any significant findings that become known in the course of the research that might effect the willingness of the subjects to take part.**
- **Protect the confidentiality of all personally identifiable information collected.**
- **Submit for review and approval by the IRB-HS all modifications to the protocol or consent form(s) prior to implementation of any change(s).**
- **Submit an activity/progress report regarding research activities to the IRB-HS on no less than an annual basis or as directed by the IRB-HS through the Continuing Review Form.**
- **Notify the IRB-HS when study has been completed through submission of a Project Completion Report.**

Should you have any questions or need any further information concerning this document please feel free to contact me at (956) 882-5083 or via email at Linda.MacDonald@utb.edu.

Sincerely yours,
Linda R. MacDonald
Linda R. MacDonald
IRB – Chair

APPENDIX D

NATIONAL LEAGUE OF NURSING APPROVAL FROM

National League for Nursing

April 17, 2009

Suzanne V. Dougherty, MSPHN, RN
University of Texas-Brownsville & Texas Southmost College
80 Fort Brown
Brownsville, TX 78520-4956

Dear Ms. Dougherty,

Thank you for your letter requesting permission to use the three research instruments developed for the NLN / Laerdal simulation study. It is my pleasure to grant you permission to incorporate the "Simulation Design Scale," "Educational Practices Questionnaire ," and "Student Satisfaction and Self-Confidence in Learning" instruments in the research study to demonstrate the use of technological resources to support alternative clinical training at the University of Texas at Brownsville.

In granting permission to use the instruments noted above, it is understood that the following assumptions operate and "caveats" will be respected:

- ✓ These instruments will be used strictly for the purposes noted above with second semester Associate Degree nursing students.
- ✓ The instruments will not be edited in any way.
- ✓ The National League for Nursing is the sole owner of these rights being granted and must be acknowledged as the source of these items.
- ✓ You own a copy of Simulation in Nursing Education: From Conceptualization to Evaluation, and are familiar with the three-year multi-site project for which this instrument was developed.
- ✓ Your NLN membership entitles you to the use of these instruments free of charge.

I am pleased that material developed by the National League for Nursing is seen as valuable as you evaluate ways to enhance learning, and I am pleased that we are able to grant permission for use of the "Simulation Design Scale," "Educational Practices Questionnaire," and "Student Satisfaction and Self-Confidence in Learning" instruments. Should you have any questions, please feel free to contact me directly. Thank you.

Most sincerely,

Mary Anne Rizzolo, EdD, FAAN
Senior Director, Professional Development
National League for Nursing
61 Broadway, 33rd Floor
New York, NY 10006
Phone: 212.812.0315 | Fax: 212.812.0391
Email: mrizzolo@nln.org

APPENDIX E

DEMOGRAPHIC INFORMATION FORM

Demographic Information

Age: _____ Gender_____Male _____Female

Race/Ethnicity

_____Hispanic

_____White

_____Black

_____Asian

_____Native Hawaiian/Pacific Islander

_____Other

Marital Status:

_____Married

_____Divorced

_____Single/Never Married

_____Widowed

Previous Educational Degree:

_____Prerequisites only

_____Technical

_____Associates

_____Bachelors

_____Masters

APPENDIX F

STUDENT SATISFACTION

AND

SELF CONFIDENCE IN LEARNING

Student Satisfaction and Self-Confidence in Learning

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

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

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

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