# FACULTY AND STUDENT PERCEPTIONS OF PREPARATION FOR AND IMPLEMENTATION OF HIGH FIDELITY SIMULATION EXPERIENCES IN ASSOCIATE DEGREE NURSING PROGRAMS

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FACULTY AND STUDENT PERCEPTIONS OF PREPARATION FOR AND IMPLEMENTATION OF HIGH FIDELITY SIMULATION EXPERIENCES IN ASSOCIATE DEGREE NURSING PROGRAMS

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# ABSTRACT

High fidelity simulation technology is being used as an alternative way to expose students to complex patient care. Research has shown that simulation experiences can improve critical thinking skills and increase students' self-confidence (Jeffries & Rizzolo, 2006). The purpose of this study was to examine nurse educator and nursing student perceptions of the best ways to prepare for and implement high fidelity human patient simulation. Data were collected from associate degree nursing faculty and students at five community colleges that use high-fidelity simulation. A mixed methods design was used to answer the seven research questions. Qualitative data were examined for patterns and themes. Descriptive statistics were used to determine participants' perceptions of the value and presence of educational best practices in the simulation. Relationships between student and teacher participants' perceptions of educational practices and simulation design characteristics were analyzed for congruency in their perceptions.

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# Chapter One: Background

## *Problem and Significance*

Nursing students' clinical experiences provide the opportunity to apply the knowledge that they have acquired through nursing theory and laboratory courses. Limitations on the availability of clinical hours allotted to nursing education programs (Feingold, Calaluce, & Kallen, 2004; Jeffries, 2008; Lasater, 2007; Medley & Horne, 2005) and the growing complexity of the patient population (Health Resources & Services Administration, 2003) increase the importance of effective clinical learning experiences for students. Many nursing students report feelings of ineptitude and a lack of confidence as they anticipate their first experiences in a new clinical area (Lasater). Research demonstrated that these factors can be a barrier to learning and critical thinking (Lasater). Therefore, studying interventions aimed at improving the clinical experience is important. Since associate degree nursing students make up the largest student cohort, addressing this clinical issue with this group is especially important.

Simulation has begun to receive attention as a method of enhancing nursing students' feelings of competence as they enter real patient clinical experiences. The precedent for this teaching method comes from non-nursing disciplines. Simulation has been used in United States Air Force training and civilian flight training with research showing positive outcomes (Eaves & Flagg, 2001; Hays, Jacobs, Prince, & Salas, 1992). Anesthesia education programs began using simulation in 1969

(Abrahamson & Denson, 1969; Bradley, 2006). Medicine incorporated simulation into its licensing examination in 2004 (Dillon, Boulet, Hawkins, & Swanson, 2004).

Using high fidelity human patient simulation (HFHPS) in nursing education is new with research in this area in its early stages (Tanner, 2006). There is little in the literature about best practices for HFHPS (Jeffries, 2008; Lasater, 2007). According to Jeffries, best practices in education encourage active learning that engages the student in the content with the outcome of increased knowledge retention.

Chickering and Gamson (1987) defined the principles of best practice in undergraduate education through their research in higher education. These principles (active learning, feedback, student/faculty interaction, collaboration, high expectations, diverse learning styles, and time on task) have become a gold standard in evaluating educational practices (Billings, 2000). Knowledge acquisition through activities that use best educational practices has been shown to result in greater learner satisfaction and confidence in the ability to transfer the knowledge to other settings (Chickering & Gamson).

Jeffries (2005) drew from Chickering and Gamson's (1987) research to develop the nursing education simulation framework (NESF) as a model for designing and implementing simulation in nursing education. The components of the model are teachers, students, educational practices, simulation design characteristics, and outcomes.

Specific to the model, the educational practices and simulation design characteristics components, as well as the learner satisfaction and self-confidence elements of the outcomes component were the study's focus. Educational practices were composed of Chickering and Gamson's (1987) principles of best practice in undergraduate education. Simulation design characteristics were derived from educational best practices (Chickering & Gamson) and included objectives, fidelity, problem solving, student support, and feedback (Jeffries, 2005).

*Associate Degree Nursing Students*

The majority of new nursing graduates come from associate degree nursing (ADN) programs, which comprised 59% of all basic nursing programs and contributed 63% of registered nurse graduates to the workforce (National League for Nursing, 2006, August; Orsolini-Hain & Waters, 2009). According to the National League for Nursing (NLN) (2005, December), the increase in numbers of students admitted to ADN programs was 60% more than admission increases to baccalaureate programs while applications to ADN programs outnumbered baccalaureate programs at a two-to-one ratio (NLN, 2006).

In an international study on the use of human patient simulation in nursing education, Nehring and Lashley (2004) found that ADN programs used human patient simulation in their curricula for more hours than baccalaureate programs. In terms of other literature related to the use of human patient simulation in ADN programs, there was little to be found. Of note, the Kansas Board of Regents (2006)

supported a major initiative for the implementation of simulation in associate degree and other nursing programs across the state.

Tuoriniemi and Schott-Baer (2008) discussed how HFHPS was implemented in an ADN program in which they taught. However, they did not conduct research on the process. Comer (2005) described ways to use HFHPS with ADN students. Results of an informal survey showed positive responses by 96% of the students surveyed (Comer). Jeffries and Rizzolo (2006) reported on the NLN/Laerdal study of simulation in which 38% of the sample subjects were ADN students. Any differences between ADN and BSN students were not reported in the findings. Wortock (2002) conducted a study of ADN students (N=54) to determine if HFHPS had any impact on critical thinking. No statistically significant results were found likely due to the small sample size (Wortock).

The greater use of HFHPS by ADN programs and the fact that the majority of nursing graduates come from these programs indicated a strong need for research involving this population, thus the study sample was drawn from ADN students and faculty.

*Purpose*

One of the principles of adult learning theory is that learners who value and are satisfied with the learning experience attain higher levels of knowledge retention and are better able to apply their learning in different settings (Chickering & Gamson, 1987; Knowles, 1973). Research has indicated that learners value and were satisfied with well-designed HFHPS (Jeffries, 2007). However, there is little in the

literature about the methods teachers use to prepare for and implement HFHPS and whether these methods follow the principles of best practices in undergraduate education. Describing how educators are implementing HFHPS can provide information for faculty development in this area and reveal areas in which further assistance may be needed to effectively use HFHPS in nursing education.

Educators can prepare for and implement HFHPS with the best educational practices in mind, but ultimately the learners participate and determine if their learning needs are being met. The purpose of this study was to examine nurse educator and nursing student perceptions of the best ways to prepare for and implement HFHPS.

*Research questions.*

1. How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education?
2. To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?
3. To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation experiences?
4. What are associate degree nursing students' perceptions of the experience of high fidelity human patient simulation?
5. What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation

experience and their perceptions of the presence and importance of educational best practices and simulation design characteristics?

6. Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high fidelity human patient simulation?
7. What is the relationship between associate degree nursing faculty and nursing students' perceptions of the presence and importance of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?

*Nursing Education Simulation Framework*

Jeffries (2005) described a theory-based framework to guide the process of developing, implementing, and testing clinical simulations. The nursing education simulation framework (NESF) was developed as part of a joint research project between the National League for Nursing (NLN) and Laerdal Medical, a manufacturer of the SimMan human patient simulator (Jeffries & Rizzolo, 2006). The goals of the project were to develop and test a framework for simulations to guide nursing educators in designing, implementing, and evaluating high fidelity human patient simulations, to explore relationships between the theoretical concepts of the framework, and to test the impact of simulations created using the framework on certain student outcomes (Jeffries & Rizzolo).

The five major components of the framework are teacher, student, educational practices, design characteristics, and outcomes. Each of the first four

components interacts with the others to create the resulting outcomes. The aim of the NESF is that teachers develop active learning experiences for diverse learning styles with high expectations for learning outcomes through collaboration and effective use of time, which are facilitated by teacher and peer feedback to learners. A basic premise of the NESF is that well-designed simulations implemented using the framework's educational practices increase learner satisfaction and self-confidence (Jeffries, 2005).

*Assumptions for the Nursing Education Simulation Framework.*

1. Well-designed simulations using educational best practices will increase learner satisfaction and self-confidence (Jeffries, 2005).
2. Students must be self-motivated and willing to be responsible for their learning (Jeffries, 2005).
3. The design of simulations must support the level of the learner (Jeffries, 2005).
4. Nursing educators will use what they perceive to be educational best practices in the learning environment (Jeffries, 2005).

A factor in the teacher component of the NESF is that teachers using active learning strategies, such as simulations, must feel comfortable with and be open to serving in the roles of facilitator and evaluator, which are learner-centered rather than teacher-centered (Jeffries, 2005; Oermann, 2004). Students must be self-motivated and willing to be responsible for their learning (Jeffries; Oermann). The educational practices concepts are based on Chickering and Gamson's (1987) principles of best practices in undergraduate education, which are also learner-

centered. Teachers who are designing simulations must consider these practices, as they will contribute to improved student performance and satisfaction with learning (Chickering & Gamson).

Well-designed simulations support learner problem-solving when design characteristics are geared to the level of the learner, the course goals, and the intended outcomes. The design characteristics component is made up of objectives, fidelity, problem solving, student support, and debriefing, which are proposed as integral elements for the promotion of positive learning outcomes. The NESF proposes that teachers use clearly written objectives to design simulations with the desired level of realism (fidelity) and complexity for the learners who will be involved (Jeffries, 2005).

The simulation begins by giving learners a minimum of information and builds on their processing of the simulation scenario by adding cues, such as patient physiologic measures, at the appropriate time. Debriefing, as the final step in the simulation, helps the learner discover and process the new or enhanced knowledge, skills, and critical thinking abilities resulting from the simulation experience. Learner satisfaction and self-confidence are affected by the simulation design characteristics and educational practices incorporated into the simulation (Jeffries, 2006).

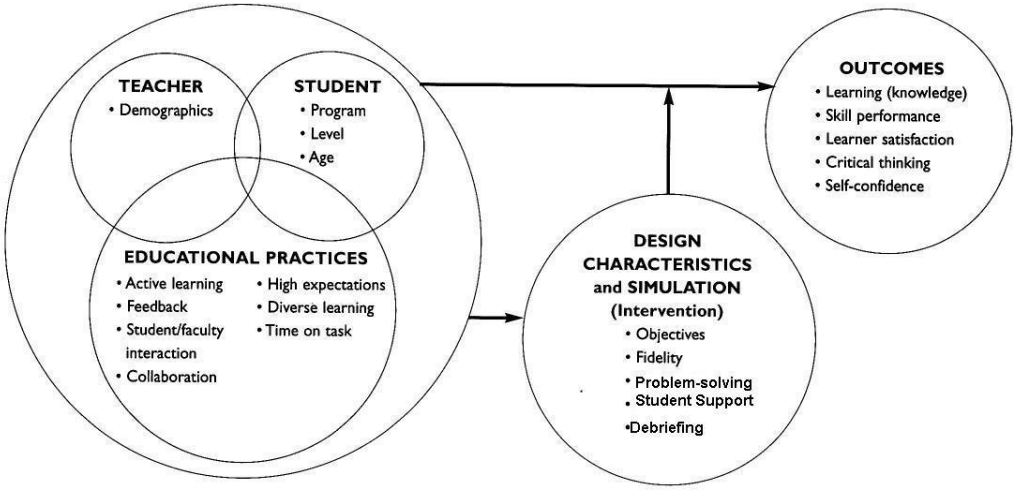


Figure 1. The Nursing Education Simulation Framework (Jeffries, 2005).

*Terms*

Active learning – A process that engages the student's participation in the learning activity (Billings & Halstead, 2005; Jeffries, 2005).

Collaboration – The process of working with others to solve situational problems and contribute to problem-solving (Jeffries, 2005).

Debriefing – An activity that reinforces positive actions of the learner and encourages reflective thinking (Jeffries, 2005).

Diverse learning styles – A variety of differences in how students learn that arise from age, culture, and other factors, such as personality type (Chickering & Gamson, 1987; Jeffries, 2005).

Feedback – The provision of evaluative information on inputs to assist in knowledge development or revision of practices (Billings & Halstead, 2005;Jeffries, 2005).

Fidelity – Describes how near the simulation is to reality. The closer to reality the simulation is, the higher the fidelity (Jeffries, 2007; Seropian, Brown, Gavilanes, & Driggers, 2004).

High expectations – Goals that are set in a manner so as to be challenging to the learner while still being achievable (Chickering & Gamson, 1987; Jeffries, 2005).

High fidelity – Simulations that contain elements designed to re-create reality as closely as possible (Jeffries, 2005).

Problem solving – Working through a situation to reach a workable resolution (Billings & Halstead, 2005; Fink, 2003). "Problem-solving is related to the level of complexity of the simulation, which is based on the knowledge and skill level of the learners" (Jeffries, 2008, p. 28).

Reflective thinking – The process of connecting a learning activity to its meaning for the learner (Billings & Halstead, 2005).

Simulation – "A near representation of an actual life event; may be presented by using computer software, role play, case studies, or games that represent reality and actively involve learners in applying the content of the lesson." (Billings & Halstead, 2005, p. 308).

Simulation design characteristics – Elements of the simulation that "support course goals, skill competencies, and learning outcomes" (Jeffries, 2005, p. 100).

Student/faculty interaction – Discussion between student and faculty aimed at improving outcomes (Billings & Halstead, 2005; Jeffries, 2005).

Student Support - Assistance for learning provided to the student. During a simulation, support is in the form of cues that guide the student toward attaining the objectives of the simulation (Jeffries, 2007).

Time on task – Making the best use of the time allotted for an activity (Chickering & Gamson, 1987).

*Assumptions of the Study*

1. The simulation laboratories at each site will be similarly equipped for high fidelity human patient simulation.
2. The high-fidelity manikins will perform consistently during the high fidelity human patient simulation experience.
3. Each student participant will prepare for the high fidelity human patient simulation experience as assigned by his or her nursing faculty.
4. Each student will be motivated to participate in the high fidelity human simulation experience.
5. Each teacher participant will be committed to using high fidelity human patient simulation with his or her students.

*Significance of the Research*

*Clinical site issues*. The Health Resources and Services Administration (HRSA) (2002) has projected a 29% shortfall of registered nurses by the year 2020 due to nurses retiring or leaving the profession, and to increased needs for nurses for an aging population with more chronic health problems and more days spent in the hospital. One response by nursing programs has been an expansion in undergraduate

nursing student enrollment (NLN, 2005, December). However, even minimal enrollment increases have led to difficulties in scheduling sites for student inpatient clinical experiences (Feingold, et.al. 2004; Jeffries, 2008; Lasater, 2007; Medley & Horne, 2005).

Traditional clinical sites, such as hospital inpatient units can accommodate limited numbers of students. A shortage of experienced staff nurses and clinical faculty as well as the need for hospitals to orient and precept inexperienced new nursing graduates limits the availability of sites for undergraduate student clinical experiences (Curl, Smith, Chisholm, & Hamilton, 2007; Jeffries, 2008).

The types of clinical experiences students have may vary significantly from student to student based on unit assignment, faculty expertise, and patient census. Furthermore, more complex experiences may be unavailable or students may be limited to an observer role because of patient safety and other quality of care issues (Decker, et. al., 2008; Jeffries, 2008).

*Student competency and safety issues*. The Institute of Medicine's (IOM) (2001; 2003) call for increased patient safety and quality of care has also raised expectations for new graduates in terms of safety and quality. Consumers and employers expect new graduates to demonstrate high levels of clinical reasoning and to be able to manage information and technology (American Association of Colleges of Nursing (AACN), 2008b; The Advisory Board Company, 2008) yet the literature indicated that they are not sufficiently prepared for the complex care environment for

which they are hired (del Bueno, 2005; Smith & Crawford, 2003; The Advisory Board Company).

New clinical models are being developed to attempt to solve these problems (Jeffries, 2008). Clinical immersion experiences, which involve students practicing on the same clinical unit for an extended and continuous period of time, have been proposed, but are limited by the availability of sites (Billings & Halstead, 2005). Skills-focused and concept-focused clinical experiences have been suggested during which students concentrate on a particular area of patient care, such as physical assessment (Billings & Halstead). Another modality that is gaining in popularity is simulation (Billings & Halstead; Jeffries).

Demonstrating that educational practices used in HFHPS are valued by learners and result in increased learner confidence and satisfaction is positive evidence for using simulation in nursing education. The encouraging learner outcomes that have been associated with HFHPS support the development of alternative clinical models to meet the need for expanded nursing program enrollment despite limited facilities for clinical nursing education experiences.

*Changing nursing education environment*. Nursing education is changing to better prepare new nursing graduates for the increasing complexity of the health care environment. An aging population subject to more chronic illnesses has contributed to the need for nursing graduates who are ready to care for high acuity patients (AACN, 2003; National League for Nursing- Accrediting Commission (NLN-AC), 2006; The Advisory Board Company, 2008). Government has mandated higher

quality and safer patient care (IOM, 2001). In addition, healthcare knowledge and technologies are evolving rapidly and require the practitioner to be actively involved in gathering new information and developing new skills to provide the best care possible to sicker patients (AACN; NLN-AC).

Also contributing to changes in nursing education are the expectations of employers for the quality and competency of care provided by new graduates (The Advisory Board Company, 2008). Nursing graduates must be prepared to seek out and use evidence-based best practices and to bring well-developed critical thinking abilities to the workplace (IOM, 2003). Additionally, educational accrediting bodies are raising standards for nursing education programs as a result of these factors (AACN, 2003; NLN-AC, 2006).

These factors coupled with the need to educate more nurses to fill current and projected vacancies have led nursing education programs to consider new clinical models. The limited availability of clinical sites and limited opportunities for student nurses to practice in complex care situations with real patients has created problems in implementing immersion and high acuity experiences (Billings & Halstead, 2005).

*Summary*

Simulation technology employing high fidelity patient simulators is being used as an alternative way to expose students to complex patient care. Research has shown that simulation experiences can improve critical thinking skills and increase students' self-confidence (Jeffries & Rizzolo, 2006). The nursing education

simulation framework, a model for best practices, has been proposed and is in the testing phase of development (Jeffries, 2005).

The largest group of new nursing graduates comes from ADN programs. Associate degree nursing programs are also using HFHPS more heavily than BSN programs, yet there is little research on this population related to simulation. Research is needed on the use of HFHPS in this population to help determine how effectively it is being used.

Most of the research on simulation in nursing education has focused on learner outcomes. Literature about the methods teachers use to prepare for and implement HFHPS and whether these methods follow the principles of best practices in undergraduate education is scarce. Research is needed that describes educator practices related to HFHPS. There may also be the potential to gain ideas or practices that may help orient faculty new to HFHPS. Additional research is needed on faculty development in this area in order to discover where further assistance may be needed to effectively use HFHPS in nursing education. This study attempted to add to the body of knowledge for HFHPS by describing how teachers prepare for and implement HFHPS, and determining students' perceptions of this educational experience.

This chapter has described the problem to be studied, the purpose of the study, and the research questions for the study. Assumptions pertinent to the study and limitations of the study have been delineated. The significance of the chosen study population has been explained. Further information providing background and

support of the need for the study will be provided in the review of literature in the next chapter of this work.

# Chapter Two: Review of literature

## *Introduction*

This chapter will present the factors behind changes that are taking place in nursing education. The paradigm shift to learner-centered educational practices as a means for preparing students as lifelong learners and high-level thinkers will be discussed. The use of high fidelity human patient simulation (HFHPS) as a complement to inpatient clinical experiences is a change that will be explored in this chapter.

While relatively new to nursing education, simulation has been used successfully in the disciplines of aviation, the military, and medicine for a number of years. This chapter will review the literature related to simulation use in these disciplines. Current research on the use of HFHPS in nursing education will be presented along with a framework for developing and implementing simulations with nursing students. Gaps in the literature about HFHPS use in nursing education will be identified to support the need for the proposed research study.

## *Background*

Nursing education is changing related to transformations nursing graduates are encountering in the work world. An aging population subject to more chronic illnesses and more complex care needs is one factor in the change (AACN, 2003; NLN-AC, 2006; The Advisory Board Company, 2008). Government mandates to provide higher quality, and safer patient care is another factor (IOM, 2001, 2003). In addition, healthcare knowledge and technologies are evolving rapidly, and require

the practitioner to be actively involved in gathering new information and developing new skills to provide the best care possible to sicker patients (AACN, 2008b; NLN-AC).

Also contributing to changes in nursing education are the expectations of employers for new graduates able to deliver quality and competent patient care (The Advisory Board Company, 2008). Nursing graduates must be prepared to seek out and use evidence-based best practices and to bring well-developed critical thinking abilities to the workplace (IOM, 2003). Additionally, educational accrediting bodies are raising standards for nursing education programs as a result of these factors (AACN, 2008b; NLN-AC, 2006).

The current and projected shortage of registered nurses has led to increased nursing program enrollments, which stretches the limits of available clinical sites to provide students with practice experiences (Billings & Halstead, 2005). Coupled with that are restrictions on students' practice with very high acuity patients in order to maintain the highest quality, safest patient care (Billings & Halstead).

Consequently nursing education is exploring new clinical models because of limited space and restricted opportunities for students to practice high-acuity care in the traditional inpatient clinical setting (Decker, et. al., 2008; Feingold, et al., 2004; IOM, 2001; Jeffries, 2008; Lasater, 2007; Medley & Horne, 2005). One such model that is relatively new to nursing education is HFHPS (Tanner, 2006).

Human simulator manikins were first used in nursing education in the late 1950s, when the Mrs. Chase prototype was introduced (Nehring, Lashley, & Ellis,

2002). Mrs. Chase manikins provided students with the opportunity to practice newly learned skills on a life-sized model that had moveable joints and openings in the appropriate places for insertion of devices, such as indwelling urinary catheters. In the 1960s the Harvey model advanced the technology with its capacity to reproduce heart and lung sounds (Nehring, et al.). Technology in this area has advanced tremendously since then to the current state of high fidelity human patient simulator manikins.

HFHPS uses standardized patients (SP) (actors portraying patients) or computerized human patient simulator manikins and realistic settings to give students simulated experiences in patient care at varying levels of complexity (Tanner, 2006). Nursing programs nationwide are investing in the technology of computerized simulators as a means of preparing students to care for complex patients they might not otherwise encounter during their nursing education clinical experiences (Jeffries, 2008; Lasater, 2007). Additionally, high fidelity simulations are being used with the goal of improving students' confidence, technical skills, and critical thinking abilities so they can more effectively use their time while on the hospital units with real patients (Feingold, et al., 2004; Goldenberg, Andrusyszyn, & Iwasiw, 2005; Jeffries, 2007; Lasater, 2007; Medley & Horne, 2005; Nehring & Lashley, 2004).

*Simulation in Other Disciplines*

*Aviation.* While high-fidelity simulation is new to nursing education, it has been used for many years in other disciplines. In aviation, flight simulators are used

to prepare pilots for the complexities of flying an aircraft. In 1910 the earliest flight simulators, developed in France, were cut-down versions of aircraft that remained on the ground, but were able to provide the feel of handling the controls while the simulator taxied. The fidelity of flight trainers increased as motors were used to simulate the changes in attitude of the aileron, elevator, and rudder experienced during flight (A brief history of aircraft flight simulation, n.d.).

In 1929 Edwin Link patented one of the first flight simulators, and in 1934 the United States Army Air Corps (now the United States Air Force) purchased Link Trainers for flight training. Link Trainers have been used by the military since 1934 to train pilots and air crews on the most sophisticated aircraft currently available (Ed Link –Father of flight simulation, n.d.).

Commercial airlines also use simulation to train pilots and crews. Crew resources management is a type of simulation training that involves not only the mechanics of flight, but also the experience of rare, but high-risk events that require teamwork among all aircraft crew members (Hunt, 2008). In a meta-analysis of flight simulator training effectiveness Hays, et al. (1992) found that in over 90% of the experimental studies analyzed simulator training followed by aircraft training produced higher pilot proficiency than aircraft training alone.

*Military.* All branches of the United States Armed Forces have incorporated simulation into the majority of weapons and vehicle training. In a report requested by the Chief of Naval Operations, the importance of simulation as a means of maintaining Navy and Marine Corps preparedness through the year 2035 was

emphasized as a critical element (National Academy of Sciences, 1997). In 1996 the Vice Chief of Staff of the Army ordered that simulation was to be embedded into all future military systems and weapons (Leitch, Moses, & McGee, 2002).

The medical branch of the United States Armed Forces has embraced simulation as a means of training personnel to deal with the situations and injuries found under combat conditions. Military researchers found that physicians, nurses, and other allied health personnel trained during peacetime were not equipped to handle combat injuries particularly in the unstable surroundings near the battlefield (Leitch, et al., 2002). Holcomb, Dumire, Crommett, Stamateris, Fagert, and Cleveland, et al. (2002) studied the effect of a resuscitation training program that used human patient simulation for ten military trauma teams. They found that the teams showed significant improvement in resuscitation skills after the training. Additionally, after the training the teams compared favorably to highly experienced teams on the same skills.

*Medicine.* Anesthesia was the first area in medicine to use simulation beginning in 1969. Abrahamson and Denson (1969) found that use of a patient anesthesia simulator resulted in faster attainment of skills competency. Most anesthesia training programs now use the Anesthesia Crisis Resource Management (ACRM) curriculum, which was based on aviation's crew resource management training. ACRM relies heavily on simulation to prepare residents to act in emergency situations that may be encountered in the operating room (Gaba, Howard, Fish, Smith, & Sowb, 2001).

Simulation moved beyond anesthesia and now encompasses medical education as a whole. Bradley (2006) described the current movement toward simulation in medical education as one that is driven by reforms aimed at improving clinical and communication skills both in new medical school graduates and in residents. He stated that much of the literature on simulation supports its effectiveness in terms of improved educational outcomes. He suggested that additional studies be employed using better research methods to evaluate the effectiveness of simulation in medical education (Bradley).

Medicine added Standardized Patient (SP) simulation to the United States Medical Licensing Examination (USMLE) in 2004 (Dillon, et al., 2004). Driving this change were Institute of Medicine (2001; 2003) recommendations for medical licensing aimed at improving the quality of healthcare. Examinees are evaluated on 12 different encounters with SPs, in areas such as assessment, history taking, and effective communication (Dillon, et al.). Dillon, et al. suggested the likelihood that high fidelity human patient simulator manikins will be included in the simulation portion of the USMLE in the future.

Although improved educational outcomes were found with simulations, there was little discussion of teaching/learning processes used in achieving these outcomes. Instead the literature on the use of simulations in other disciplines focused primarily on outcomes, such as improved weapons operations or pilot proficiency.

In aviation, the military, and medicine a mistake made by a learner can result in dire consequences to those involved due to the high stakes nature of the work. Thus, simulation is of great importance because learners are able to learn and make mistakes in a safe environment, so that they are less likely to make them during a real situation involving human beings.

*Changes in Nursing Education*

Although nurse educators recognize the need for new ways of preparing students for the rapidly evolving climate of healthcare, it is clear that changes must go beyond clinical models to include changes in the educational process. In response, nursing education is shifting its focus from a teacher-centered paradigm to a learner-centered paradigm (Billings & Halstead, 2005; Gaberson & Oermann, 2007; Johnson, 2009; Oermann & Gaberson, 2006).

The teacher is no longer the source of all the necessary knowledge a student needs in his or her nursing career. Instead the teacher has become a facilitator of learning and students are encouraged to construct their own relevant knowledge (Billings & Halstead. 2005; Gaberson & Oermann, 2007; Johnson, 2009; Oermann & Gaberson, 2006).

However, research shows that nursing students' critical thinking abilities often remain unchanged or even decreased by the end of their nursing education (Giddens & Gloeckner, 2005; Murphy, 2004; Riddell, 2007). In addition, students voiced dissatisfaction with teaching methods that did not tell them what they needed to know (Bonwell, 2000; Palloff & Pratt, 2001; Pardue & Morgan, 2008), and nurse

educators stated that students were not willing to be active learners (Pallof & Pratt; Pardue & Morgan). Questions still exist specific to variables of teachers' methods, students' motivation, and critical thinking outcomes.

Teachers and learners must understand each other's needs and expectations (Billings & Halstead, 2005; Walker, Martin, Haynie, Norwood, White, & Grant, 2007). Active learning methods have been espoused as a means for increasing critical thinking and long-term knowledge retention, but it does not mean learners have had experience with learner focused teaching methods in their formal education (Bonwell, 2000; Fink, 2003; Pardue & Morgan, 2008). Teachers may embrace new teaching methods and technologies in their desire to develop qualities in learners that prepare them for the nursing world they will enter, but it does not mean they have had experience with best practices for using these methods (Billings, Skiba, & Connors, 2005). Both teachers and learners have likely had much more experience with Instructivist teacher-centered methods that predominantly use lecture to deliver content for learners to passively receive (Diaz & Bontenbal, 2000; Fink, 2003; Gibson, 2009).

There is a disconnect between teachers and learners that results in frustration on both sides and leads to statements that new teaching methods and technologies just do not work and are not worth the time involved to use them (Billings, et al., 2005; Bonwell, 2000; Fink, 2003; Gibson, 2009; Jeffries, 2008; Nehring & Lashley, 2004). Assessing the needs of both teachers and learners is likely to lead to a solution to this problem (Billings et al.; Bonwell; Fink).

*Needs of teachers and learners.* According to research on the youngest generation of learners, born from 1981 to 2003 and labeled Millennials, learner-centered practices are the optimum approach. These students are characterized as well versed in current communication technology, in touch with the world, and ready to be involved in what interests them (Billings & Halstead, 2005; Billings, Skiba, & Connors, 2005; Gibson, 2009; Palloff & Pratt, 2001; Pardue & Morgan, 2008).

However, the age of students in a nursing education program can vary widely from Millennials to Gen-Xers to even Baby Boomers. Thus Gen-Xer students, born between 1961 and 1980, know how to learn with technology, prefer to work alone, and are task and results oriented, while Baby Boomers are technology immigrants who are used to the teacher-centered structure of the traditional classroom (Billings & Halstead, 2005; Gibson, 2009; Palloff & Pratt, 2001). In addition the nursing student population has become increasingly diverse with ethnic minorities comprising 24.5% and males contributing 12.1% of nursing graduates in 2006 (NLN, 2006), with the most diversity in age, ethnicity, and percentage of male students found in the associate degree population (Johnson, 2009; Martin, Yarbrough, & Alfred, 2003; NLN; Oermann, 1998). In contrast, the majority of nursing faculty are white females with an average age of 55 years. Racial and ethnic diversity accounted for only 7% of nursing faculty (AACN, 2008a; NLN, 2007).

The diversity of the nursing student population is likely to result in a learning environment where some students are comfortable with simulation technology, while others may be intimidated by it (Billings & Halstead, 2005; Palloff & Pratt, 2001).

There is also the likelihood that nursing faculty will find learning to use simulation technology challenging and time consuming (Kardong-Edgren, Starkweather, & Ward, 2008; Smith-Stoner, 2009).

*Constructivism.* When considering how best to meet the needs created by cultural, gender, and age differences among faculty and students, exploring the larger concepts of learning to learn and facilitating learning are likely to provide the answers. To understand these concepts, it is necessary to examine the educational framework known as Constructivism. Constructivists emphasize the importance of active learning methods to encourage learners to construct their own knowledge and then to apply it (Billings & Halstead, 2005; Diaz & Bontenbal, 2000).

Many theories fall under the umbrella of Constructivism. Bruner's (1991) theoretical framework, which was influenced by Vygotsky and Piaget, stated that learners build upon existing knowledge to construct new ideas. Through the process of active learning, new information is given meaning in the context of previous experiences (Bruner).

Knowles (1973) focused on andragogy, also known as adult learning theory. He also saw that adult learners drew on past experiences when applying new knowledge to solve problems. According to Knowles adults preferred to be actively involved in their learning. His theory has been used extensively in guiding adult learning.

Experiential learning theory (Kolb, Boyatzis, & Mainemelis, 1999) also emphasized learners' active participation in the learning experience. Research in

higher education demonstrated learners retain more knowledge and are better able to apply it when the principles of Constructivism are applied (Fink, 2003).

Chickering and Gamson (1987) conducted research related to Constructivist philosophy and developed the following principles for best practice in undergraduate education –

1. Contact between students and faculty is encouraged.
2. Reciprocity and cooperation among students is fostered.
3. Active learning techniques are used.
4. Teachers give prompt feedback.
5. Time on task is emphasized.
6. High expectations are communicated to learners.
7. Diverse talents and ways of learning are respected.

Key to these principles and to Constructivism itself are the roles of the learner and the teacher. Learners are expected to be motivated by their interest in the subject matter and to be actively involved in constructing their own knowledge. Teachers are expected to be facilitators of learning and to guide students through assessment of their individual needs toward attainment of the learning objectives (Billings & Halstead, 2005; Fink, 2003).

*Application of Constructivism principles to simulation in nursing education.* Facilitating learning involves a number of factors that can be applied to the implementation of any kind of active learning technique. One such technique is

HFHPS, which is designed to give students simulated experiences in patient care at varying levels of complexity (Tanner, 2006).

The general principles of constructivism and the principles of best practice in undergraduate education have relevance to application in HFHPS in nursing education. Fink (2003) stated that a cohesive teaching strategy involves the use of a number of teaching techniques applied in the appropriate context of the right setting and the right content. Implementation of a teaching technique to facilitate learning begins with the teacher gaining knowledge of the technique and how to apply it (Bonwell, 2000; Fink, 2003; McKeachie & Svinicki, 2006; Mezirow, 1981).

Vendors of the simulator manikins offer training in the operation of the equipment (Gaumard, 2008; Laerdal, 2008; Medical Information Technologies, 2008). The NLN and nursing schools already using simulation promote local and regional training workshops in simulation (Johnson County Community College, 2008; Metropolitan Community Colleges, 2008; NLN, 2008). As the teacher studies the particular technique and begins to understand the full scope of its usefulness, it is necessary to define his or her expectations for the technique (Bonwell, 2000; Fink, 2003; McKeachie & Svinicki, 2006; Mezirow, 1981).

Expectations include planning how it will be used with learners. What is the desired outcome? How can this technique be used to help learners achieve that outcome? Billings & Halstead (2005) emphasized the importance of gearing the complexity of the simulation to the level of the learner. Jeffries (2007) recommended a systematic approach to planning the implementation of HFHPS with

nursing students and developed a simulation design element template (SDET) to insure that no important aspects of the simulation experience were overlooked in the planning stage (Jeffries). The SDET was based on important elements of simulation design and implementation as designated in Jeffries' nursing education simulation framework. The SDET covers everything from supplies for the simulation to learning objectives to pre-simulation preparation of students. Use of the SDET or a similar checklist can assist teachers in planning the learning experience.

Students need to be oriented to new teaching methods and technologies (Fink, 2003; McKeachie & Svinicki, 2006). They need to know the purpose of the teaching strategy and what is expected of them (Fink; McKeachie & Svinicki). Questions faculty need to address when planning for HFHPS include: What are the resources, both human and physical, that students can draw upon during the implementation of the method? How should students prepare ahead of time? What are the expected outcomes? Will students be graded or evaluated?

In HFHPS extensive orientation is needed, particularly for learners who are experiencing it for the first time. Part of the orientation generally includes a preparatory assignment related to content knowledge that will be applied during the simulation scenario (Billings & Halstead, 2005; Bruce, Scherer, Curran, Urschel, Erdley, & Ball, 2009; Childs & Sepples, 2006; Comer, 2005; Gaberson & Oermann, 2007; Jeffries, 2007). Learners should also be introduced to the physical features of the simulator, such as the air compressors many simulators use to create the physical

manifestations of respiration and pulses. These compressors can be quite noisy and may distract learners if they are not prepared for it (Anthony, 2008).

Often simulators are tethered to other pieces of equipment by thick cords and wires that emerge from the back of the simulator. While efforts are made to keep the tethered elements out of the way, learners need to know the importance of maintaining these connections and avoiding entanglement. The “skin” of a simulator may range from feeling quite real to feeling like the vinyl material of which it is made. In some cases the fidelity (or realness) of the skin also means increased fragility and indicates the need for greater care in handling the simulator (Anthony, 2008). These are just a few of the physical elements of a simulator that can impact the experience of the HFHPS for the learner if proper orientation is not done (Childs & Sepples, 2006; Comer, 2005; Jeffries, 2007).

Learners need to be oriented to the specific role assignments they will have during the simulation experience. Nursing roles such as primary nurse, charge nurse, and medication nurse are recommended because they give learners the chance to practice role activities they will have when they become registered nurses, and they tend to increase learners’ engagement in the simulation experience (Childs & Sepples, 2006; Comer, 2005; Jeffries, 2007). Additionally, orientation to the scenario including a report of the patient history and status, and physician orders is needed. Learning objectives, the expected length of time for the scenario, and the type of evaluation if any that is involved should be presented to learners (Childs & Sepples; Comer; Jeffries).

Learners should be oriented to resources available in the simulation room such as equipment and supplies, including intravenous pumps, medications, and dressings (Childs & Sepples, 2006; Comer, 2005; Jeffries, 2007). It is also important for learners to know the human resources accessible to them during the scenario (Childs & Sepples; Comer; Jeffries). Students also need information such as whether or not they can call the physician or the pharmacy for information. They will need to know what the role of faculty is during the simulation.

Literature suggests that teachers should continue as facilitators of learning during the HFHPS experience by guiding the learning and giving the learner a sense of direction (Gaberson & Oermann, 2007; McKeachie & Svinicki, 2006). By releasing tight control over how learning occurs, teachers allow learners to find their way, with guidance, to the intended learning outcome.

In HFHPS guidance is often provided through prompts or cues from the simulator or other equipment (Jeffries, 2007; Larew, Lessons, Spunt, Foster, & Covington, 2006). For example, the simulator's blood pressure, pulse rate, and cardiac rhythm can be programmed to certain parameters. As learners recognize and respond to the information, the results of their actions can be displayed on bedside monitor screens to guide them to the next steps in patient care.

Direct cueing or prompting by the teacher is usually seen as a last resort when learners have lost control of the simulation scenario (Larew, et al., 2006). Some users of HFHPS are opposed to direct cueing at any time and suggest ending the scenario instead (Larew, et al.; NLN, 2008). Pre-simulation preparation and

orientation appear to have a large impact on the learners' abilities to work through a scenario and achieve the learning objectives (Childs & Sepples, 2006; Comer, 2005; Jeffries, 2007; Larew, et al.).

The final element of facilitating active learning is debriefing to allow learners to reflect on the experience and find the meaning (Billings & Halstead, 2005; Chickering & Gamson, 1987; Fink, 2003). This is an opportunity to foster learning by receiving feedback from the teacher and from other learners in a non-threatening atmosphere of reciprocity and collaboration (Billings & Halstead; Chickering & Gamson; Fink; Jeffries, 2007). Research confirms the importance of this final step in HFHPS or any other type of active learning technique (Billings & Halstead; Cantrell, 2008; Chickering & Gamson; Fink; Gaberson & Oermann, 2007).

In HFHPS debriefing is usually carried out immediately following the simulation experience (Childs & Sepples, 2006; Comer, 2005; Jeffries, 2007; Larew, et al., 2006). Videotaping the simulation is recommended to assist learners in discovering what was done well during the simulation and what they might have done differently (Jeffries; NLN, 2008, February). Some nursing programs do videotape simulations and show parts of them to their students during the debriefing. An important caveat of the debriefing experience is that it is non-judgmental and is to be kept confidential among the participants (Jeffries).

Facilitating learning under the Constructivist paradigm uses best practices in undergraduate education. These practices include orienting learners to the learning technique that will be used, helping learners prepare for the HFHPS, guiding learners

during the activity, and debriefing them at the conclusion for the purposes of finding meaning and solidifying knowledge gained. Application of this process to HFHPS in nursing education should therefore, promote increased knowledge retention and improved critical thinking abilities in nursing students as they care for real patients during clinical experiences, sit for the NCLEX-RN, and begin their careers as professional nurses.

*High fidelity human patient simulation in nursing education.* The body of nursing research on HFHPS is growing, however in comparison to medical education research it is sparse. For example, searches of the PubMed and the ProQuest databases for research on simulation in nursing education yielded less than 100 articles and dissertations, of which approximately half described research studies. In addition, the need for more nursing research was a common theme in the literature (Decker, et al., 2008; Feingold, et al., 2004; Hoadley, 2009; Jeffries 2006; Jeffries & Rizzolo, 2006; Lasater, 2007; Medley & Horne, 2005; Tanner, 2006).

In contrast, a similar search for medical education resulted in nearly 300 articles, nearly 75% of which were research studies. Much of this can be attributed to the much longer history of simulation use in medical education.

To date most of the research on simulation in nursing education has focused on learner outcomes of self-efficacy, confidence, and satisfaction. Critical thinking, clinical reasoning, and the impact of HFHPS on knowledge attainment have also been studied.

Student response to HFHPS has been reported as overwhelmingly positive with high satisfaction (Alinier, Hunt, Gordon, & Harwood, 2006; Bearnson & Wiker, 2005; Becker, Rose, Berg, Park, & Shatzer, 2006; Bruce, Bridges, & Holcomb, 2003; Childs & Sepples, 2006; Feingold, et al., 2004; Fountain & Alfred, 2009; Gates, Fitzwater, & Telintelo, 2001; Gibbons, Adamo, Padden, Ricciardi, Graziano, Levine, & Hawkins, 2002; Hoadley, 2009; Henneman & Cunningham, 2005; Jeffries & Rizzolo, 2006; Kardong-Edgren, et al., 2008; Rhodes & Curran, 2005; Smith & Roehrs, 2009). Increases in self-efficacy and self-confidence scores after a HFHPS experience were found by Alinier, et al., Fountain and Alfred, Goldenberg, et al. (2005), Hoadley, Jeffries and Rizzolo, Kardong-Edgren, et al., Leigh (2008), Michael (2005), Moran, 2009, Ravert (2004), and Smith and Roehrs.

Clinical competence (Alinier, et al., 2006), critical thinking (Becker, 2007; Bruce, et al.; Howard, 2007; Ravert, 2004, 2008), and clinical judgment (Bambini, Washburn, & Perkins, 2009; Bruce, et al.; Lasater, 2007) were also shown to be higher after a HFHPS experience. Additionally, Ackerman, Kenny, and Walker (2007) found increased knowledge retention of CPR skills in BSN students after receiving training with a HFHPS compared with traditional American Heart Association training. In contrast, Dobbs, Sweitzer, and Jeffries (2006), Gibbons, et al. (2002), Griggs (2003), Hoadley (2009), Jamison, Hovancsek, and Clochesy (2006), Jeffries & Rizzolo (2006), and Scherer and Runkawatt (2007) found no significant differences in immediate knowledge gain between groups of students participating in HFHPS and those where methods such as case studies were used.

The literature on nursing educators' perceptions of HFHPS is largely anecdotal. However, Jones (2005) did employ a descriptive research design to survey faculty members at one Midwestern college of nursing, and found the majority perceived they would need significant release time to plan and implement simulation in their courses. In other accounts, the majority of nursing educators liked the idea of using HFHPS with their students, but the amount of time required to learn how to use the simulator manikins, and develop scenarios was a commonly described drawback (Bruce, Scherer, Curran, Urschel, Erdley, & Ball, 2009; Medley & Horne, 2005; Starkweather & Kardong-Edgren, 2008).

Educators stated that students seemed to benefit from HFHPS experiences by demonstrating increased competency and self-confidence in the clinical setting (Medley & Horne; Starkweather &Kardong-Edgren; Tuoriniemi & Schott-Baer, 2008;). The literature also suggested methods educators could use to prepare themselves and their students for HFHPS, and described steps in the implementation of HFHPS (Billings & Halstead, 2005; Bruce, et al.; Jeffries, 2006; Jeffries & Rizzolo, 2006; Medley & Horne; Starkweather & Kardong-Edgren; Tuoriniemi & Schott-Baer).

*Nursing Education Simulation Framework and Related Measurement Instruments*

By far the largest study of HFHPS is the joint NLN/Laerdal study, which was designed to develop and test a teaching-learning framework for using simulations in nursing education (Jeffries & Rizzolo, 2006). The nursing education simulation framework (NESF) included the major concepts of teacher, student,

educational practices, simulation design characteristics, and outcomes. Using this framework, the national multi-site project explored "how to design simulations, implement simulations, as a teaching strategy, and evaluate selected learning outcomes, using simulations" (Jeffries & Rizzolo, p. 148).

The study sample consisted of 403 BSN and ADN nursing students enrolled in their first medical-surgical nursing course. Subjects were divided into three groups that participated in different types of simulation experiences related to postoperative nursing care – a paper and pencil case study, a simulation employing a static manikin, and a high fidelity human patient simulation using a computerized manikin.

During the course of the project four instruments, developed to measure concepts that were a part of the NESF, were administered. The Educational Practices in Simulation Scale (Student Version) (EPSS-S) measured the subjects' perceptions of the value and presence of Chickering and Gamson's best practices in education. The Simulation Design Scale (Student Version) (SDS-S) evaluated simulation objectives/information, support, problem solving, feedback, and fidelity as perceived by the subjects. The Student Satisfaction with Learning Scale (LSS) and the Self-Confidence in Learning Using Simulation Scale (LSCS) measured subjects' satisfaction and self-confidence after participating in the simulation experiences (Jeffries & Rizzolo, 2006).

The educational practices measured in the EPSS-S were drawn from Chickering and Gamson's (1987) best practices in undergraduate education. A panel

of ten content experts in simulation development and testing determined content validity for both the EPSS-S and the SDS-S (Jeffries & Rizzolo, 2006). Content validity for both the LSS and LSCS was established by a panel of nine clinical experts (Jeffries & Rizzolo).

Additionally, knowledge gain was measured using parallel forms of a multiple-choice test on the post-operative care content. Higher order thinking was measured with the Self-Perceived Judgment Performance Scale, which was modified from the Judgment Performance Scale developed by Facione and Facione (Jeffries & Rizzolo, 2006). Content validity of both tests was established by experienced faculty.

Findings from the study indicated that subjects felt more confident about postoperative care and were more satisfied after HFHPS experiences than other simulation experiences. Subjects in the HFHPS group also perceived a greater involvement in active and diverse ways of learning than did the other groups. The data on subject satisfaction was deemed to support the conclusion that HFHPS experiences designed using the elements specified in the NESF included more of Chickering & Gamson's (1987) principles of best practice in education. Another important finding of the study was high internal consistency reliabilities for the EPSS-S, the SDS-S, the LSS, and the LSCS, which indicated the usefulness of these instruments for further research on simulation and testing of the NESF model (Jeffries & Rizzolo, 2006).

As part of phase II of the NLN/Laerdal project Childs and Sepples (2006) developed and implemented HFHPS scenarios using the NESF. The purpose was to study the responses of a sample of 55 BSN students to the educational practices and simulation design characteristics included in a HFHPS for a mock code. The EPSS-S and the SDS-S were used with results showing students most valued fidelity, level of complexity, and feedback in the HFHPS experience. Students also rated the experience as highly positive (Childs & Sepples). The instruments were found to be valid and reliable, but no details were provided to support this finding.

Hoadley (2009) studied the differences in outcomes between groups taught advanced cardiac life support using HFHPS manikins and usual low fidelity methods. Her study of 53 health care providers including nurses and physicians found higher scores on knowledge and resuscitation skills in the group using HFHPS. The SDS-S, LSS, and LSCS were used in the study with the results showing students valued feedback most and found it to be the most highly present simulation design characteristic in the HFHPS experience. No reliability statistics were reported for any of the instruments used in the study.

Fountain and Alfred (2009) studied the relationship of satisfaction and self-confidence after a HFHPS to learning styles using the LSS and LSCS. Results from this study of 78 BSN students showed the social learning style and solitary learning style were significantly correlated with satisfaction. Cronbach's alphas indicating good internal consistency reliability were reported for the LSS (0.91) and LSCS (0.84) (Fountain & Alfred).

Dobbs, et al. (2006) used a HFHPS insulin-management scenario with 60 BSN students to test simulation design features and selected outcomes using the NESF as the model for the study. The variables of educational practices, simulation design characteristics, learner satisfaction and self-confidence were measured using the EPSS-S, the SDS-S, the LSS, and the LSCS respectively. Results showed that educational practices and design characteristics indicative of educational best practices were present in the simulation. Learner satisfaction and self-confidence were also improved after the simulation experience (Dobbs, et al.).

Smith and Roehrs (2009) used the NESF framework to examine factors correlated with student satisfaction and self-confidence after a HFHPS. The SDS-S, LSS, and LSCS were used in the study. Results indicated this sample of 68 BSN students found feedback was the most highly present SDS-S component in the HFHPS while objectives had the lowest presence. Satisfaction and self-confidence were most highly correlated with the presence of objectives and problem solving in the HFHPS (Smith & Roehrs). Instrument reliabilities were not reported in this study.

Kardong-Edgren, et al. (2008) used the NESF to develop three simulation scenarios implemented with 100 BSN students at three points during a nursing skills course. Students evaluated the simulation experience using the EPSS-S, SDS-S, LSS, and the LSCS. Teachers evaluated the experience through an open-ended questionnaire that was subsequently analyzed for themes and patterns.

Student findings indicated high overall satisfaction and increased confidence after each simulation experience. Results from the EPSS-S and the SDS-S also showed that appropriate simulation design methods and educational practices were applied in the simulation. Faculty reported high satisfaction with the simulation process. In addition, results revealed that decreases in scores on the SDS-S after the second simulation experience aided in discovering a problem with fidelity in that simulation (Kardong-Edgren, et al., 2008).

Though not specifically stated, it appeared Kardong-Edgren, et al. (2008) found the NESF to be a useful framework for studying the design and implementation of high fidelity human patient simulations as it provided structure that was especially helpful to faculty not experienced with HFHPS. The four related measurement instruments seemed to be useful for quantifying student experiences with simulation. As these are very new instruments, it is unfortunate that the authors did not report on their reliability for this study.

The research described above supported the NESF as an appropriate framework for studying HFHPS in nursing education. The instruments – EPSS-S, SDS-S, LSS, and LSCS – were found to be valid and reliable in each of these studies. This is a good beginning, but certainly indicates the need for further research using the NESF and the related instruments.

*Disparities in the Research for Type of Nursing Education Program Studied*

According to the NLN (2005, December), the increase in numbers of students admitted to ADN programs was 60% more than admission increases in baccalaureate

programs while applications to ADN programs outnumbered baccalaureate programs at a two-to-one ratio (NLN, 2006). ADN programs accounted for 59% of all basic nursing programs and 63% of all registered nurse graduates (NLN, 2006, August).

ADN students were found on average to be older than BSN students (Martin, Yarbrough, & Alfred, 2003; Oermann, 1998) and there were also significantly higher percentages of males (Martin, et al.; NLN, 2006) and minority students (Martin, et al.) enrolled in ADN programs than in BSN programs. Furthermore, according to Nehring and Lashley (2004), ADN programs used HFHPS in their curricula for more hours per student than BSN programs. Despite these noteworthy differences, the review of the literature on HFHPS yielded only eight articles or dissertations that included ADN students or faculty.

Moran (2009) described the integration of HFHPS into an ADN curriculum using mini-scenarios in which four or five students participated while others in the course watched via closed circuit transmission to the classroom. Her survey of 57 students showed 93% believed the mini-scenarios improved their understanding of course content and 89% thought their clinical decision making was enhanced. Other results showed 89% had increased confidence and found the mini-scenarios non-threatening as a teaching method.

Neuman, Pardue, Grady, Gray, Hobbins, Edelstein, and Herrman (2009) studied students' perceptions of innovative teaching/learning strategies in ADN, BSN, and MSN students. Faculty in each program type assigned students to use an innovative strategy to present information specific to course objectives. The ADN

group consisting of 11 students wrote a patient scenario for HFHPS. Results of this qualitative study showed students valued the opportunity to use innovative strategies, but found the time involved to be too great (Neuman, et al.).

Kinney and Henderson (2008) compared the effect of low fidelity simulation using an interactive CD-ROM and traditional lecture versus traditional lecture in a pharmacology course in which 43 ADN students were enrolled. Pre-test post-test results showed significant differences in knowledge level change for both groups with the CD-ROM group showing greater change than the lecture group. Post-test scores four months later revealed no significant differences in knowledge retention between the two groups (Kinney & Henderson).

Thirty-eight percent of the sample subjects in the NLN/Laerdal study were ADN students, but no differences between ADN and BSN students were reported on in the results (Jeffries & Rizzolo, 2006). Wortock (2002) studied the effect of HFHPS on critical thinking in ADN students with inconclusive results. She postulated that the small sample size (N = 54) in the four by two factorial study design left her study underpowered and resulted in the lack of statistical significance (Wortock).

Comer (2005) described the implementation of HFHPS in a critical care course in an ADN program and collected feedback from students through informal surveys administered after the HFHPS experience. She found that 96% of the students responded “favorably”, enjoyed the activity and found it to be a “better way to learn nursing interventions” (Comer, p. 360). Tuoriniemi and Schott-Baer (2008)

simply explained the process for setting up a simulation lab and implementing HFHPS in the ADN program in which they taught.

In an attempt to better understand the similarities and differences that might exist between ADN and BSN programs and students, a broader search of the literature was conducted. A few studies were found that compared differences between ADN and BSN students on outcomes not related to HFHPS.

In a sample of 120 registered nurses, Ham (2004) found no differences in ethical dilemma decision-making between nurses who graduated from ADN programs and those who graduated from BSN or higher programs. Smith (2002) performed a secondary analysis of data from the National Council of State Boards of Nursing 1999 RN Practice Analysis survey to look for differences in the frequency of practice activities performed by RNs in their first six months of practice based on educational preparation. In this sample of 1385 respondents, Smith found no significant differences in ADN versus BSN graduates in the performance frequency of 189 nursing activities. Johnson (1999) administered the Watson-Glaser Critical Thinking Appraisal Tool to 31 recent nursing graduates and found no significant differences in critical thinking skills of ADN graduates and BSN graduates.

Martin, et al. (2003) studied differences in professional values in a sample comprised of 1450 ADN and BSN students. They found that ADN students scored higher than their BSN counterparts in the areas of confidentiality, accountability, use of informed judgment, participation in professional activities, and promotion of public health (Martin, et al.). Oermann (1998) studied differences in clinical

experience stressors of ADN and BSN students. She found that while both groups experienced similar levels of stress, the clinical instructor was the greatest source of stress for ADN students while the demands of patient care created more stress for BSN students. Both groups indicated the teacher was the primary facilitator of learning in the clinical area (Oermann).

While there are certainly many similarities between ADN and BSN nursing programs and their students, the differences that exist are significant and support the need for research that studies the ADN population, especially in the area of HFHPS. It is also important to note that although ADN and BSN students view nursing faculty as the facilitator of clinical learning and the clinical instructor is the top stressor for ADN students (Oermann, 1998), little research was found that studied faculty.

Johnson (2009) surveyed 407 ADN faculty to study the effect of organizational culture on the perception of empowerment, which was defined as perceived control over decision-making and outcomes in the work setting. She found that faculty who were involved in curriculum development, held a higher ranking faculty position, and identified a degree of responsibility within the work environment had a greater perception of empowerment. Johnson asserted that faculty empowerment resulted in teaching behaviors that were empowering to students. She concluded student empowerment was critical to the development of future nurses able to meet the challenges of the changing health care environment (Johnson).

Porterfield (2004) used the Personal Human Resource Development Style Inventory to study ADN educators' andragogical orientation and its relationship to educational experience with adult learning, number of years of teaching experience, content taught, and semester assignment in the program. No significant correlations to andragogical orientation were found for exposure to adult learning education or for years taught. However, it was found that faculty who taught Pediatrics or Leadership courses, or who were assigned to the third semester of the program had low andragogical orientation (Porterfield).

In earlier work, Lilly (1990) studied the relationship of faculty learning and leadership styles to the selection of instructional strategies using Kolb's Leadership Style Inventory and Hersey and Blanchard's Leader Effectiveness and Adaptability Description Inventory. Her study included ADN as well BSN faculty, and concluded that both groups had similar learning and leadership styles. They also tended to use traditional teaching strategies, such as lecture, case studies, and classroom discussion. Additionally, she concluded that variables other than learning and leadership styles might also impact the choice of instructional strategy (Lilly).

There is a large gap in time between the Johnson (2009) and Porterfield (2004) studies and Lilly's (1990) study. Porterfield and Lilly noted difficulties in determining what drives nurse educators' choice of teaching strategies. Johnson (2009) concluded teaching behaviors had an impact on nursing graduates' ability to adapt in a changing health care climate. Also of importance is the emphasis that has been placed on evidence-based teaching practices and active learning strategies in

the time since Lilly's (1990) study was conducted (AACN, 1998; NLN-AC, 2006). In view of this fact, it would seem that there is certainly a need for research specific to teaching approaches for HFHPS to add to this body of nursing knowledge.

*Summary*

This chapter described the factors that serve as the impetus for change in nursing education. An aging population, government mandates for safer patient care, technological advances, and the expectations of employers are among these (AACN, 1998; IOM, 2001, 2003; The Advisory Board Company, 2008). Increased nursing school enrollment has also strained the limits of available clinical sites and created the need to explore new clinical models (Decker, et al. 2008; Feingold, et al., 2004; Jeffries, 2008; Lasater, 2007; Medley & Horne, 2005).

High fidelity human patient simulation (HFHPS) is one such model that is being explored in nursing education (Tanner, 2006). Other disciplines, such as aviation, the military, and medicine have successfully used HFHPS for many years to train personnel for high risk events in a safe environment (Abrahamson & Denson, 1969; A brief history of aircraft flight simulation, n.d.; Bradley, 2006; Dillon, et al., 2004; Ed Link – Father of flight simulation, n.d.; Gaba, et al., 2001; Hays, et al., 1992; Holcomb, et al., 2002; Hunt, 2008; Leitch, et al., 2002).

In addition, this chapter discussed the shift from a teacher-centered to a learner-centered educational paradigm that is needed to prepare students to be lifelong learners who can effectively use well-developed critical thinking skills (Billings & Halstead, 2005; Gaberson & Oermann, 2007; Oermann & Gaberson,

2006). The challenges that arise with generational differences in learners as well as teachers were described (Billings & Halstead, 2005; Billings, et al., 2005; Bonwell, 2000; Fink, 2003; Palloff & Pratt, 2001; Pardue & Morgan, 2008) and the conclusion reached that Constructivist methods might best answer those challenges (Billings & Halstead; Diaz & Bontenbal, 2000). Chickering & Gamson's (1987). Work on best practices in undergraduate education exemplified the Constructivist philosophy and a description of its application to the use of HFHPS in nursing education was provided.

The volume of literature on HFHPS in nursing education was compared to literature from medical education and found to be relatively sparse indicating a need for further research in this area. Researchers have found that learners responded positively and were satisfied with HFHPS (Alinier, et al., 2006; Bambini, et al., 2009; Bearnson & Wiker, 2005; Becker, et al., 2006; Bruce, et al., 2003; Childs & Sepples, 2006; Feingold, et al., 2004; Gates, et al., 2001; Gibbons, Adamo, et al., 2002; Henneman & Cunningham, 2005; Jeffries & Rizzolo, 2006; Kardong-Edgren, et al., 2008; Rhodes & Curran, 2005). Self-confidence, self-efficacy, clinical competence, critical thinking, and clinical judgment appeared improved after HFHPS experiences (Alinier, et al.; Becker, 2007; Bruce, et al.; Fountain & Alfred, 2009; Goldenberg, et al., 2005; Hoadley, 2009; Howard, 2007; Jeffries & Rizzolo; Kardong-Edgren, et al., Leigh, 2008; Lasater, 2007; Michael, 2005; Ravert, 2004, 2008). However, the effect of HFHPS on knowledge was mixed (Ackerman, 2007;

Dobbs, et al., 2006; Gibbons, et al., 2002; Griggs, 2003; Jamison, et al., 2006; Jeffries & Rizzolo, 2006; Kinney & Henderson, 2008; Scherer & Runkawatt, 2007).

Little research was found on nursing educators' perceptions of HFHPS. They did appear to favor the use of HFHPS with their students, but commented that learning to use the simulator manikins and develop scenarios required significant amounts of time (Medley & Horne, 2005; Neuman, et al., 2009; Starkweather & Kardong-Edgren, 2008).

A nursing education simulation framework was proposed by Jeffries (2005) to guide the development and implementation of HFHPS in nursing education. Instruments were developed to measure the educational practices, simulation design characteristics, learner self-confidence, and learner satisfaction components of the framework (Jeffries & Rizzolo, 2006). Early research using the framework and related instruments supported the contention that students perceived the presence and importance of best educational practices in HFHPS (Childs & Sepples, 2006; Dobbs, et al., 2006; Fountain & Alfred, 2009; Hoadley, 2009; Jeffries & Rizzolo, 2006; Kardong-Edgren, et al., 2008; Smith & Roehrs, 2009).

Most of the research on HFHPS and on nursing education itself was found to focus on the BSN student population. The lack of literature on ADN programs, faculty and students coupled with the facts that ADN programs produce the majority of nursing graduates and use HFHPS for more hours in their curricula supported the choice of this population for the proposed study.

The findings thus far on the use of HFHPS in nursing education are positive and promising, but research in this area is limited and in its early stages. HFHPS is a new teaching strategy that is stretching the capacities of teachers to develop the best educational experiences possible for their students. Therefore, it is important to learn how teachers prepare for and implement HFHPS and to collect more information about students' perceptions of the experience.

# Chapter Three: Methods

## *Introduction*

This study, using the innovative approach of examining the perspectives of both students and faculty who have experienced high fidelity human patient simulation (HFHPS), will provide significant information about the implementation of HFHPS. The study's methodology presented in this chapter includes a detailed explanation of the plan for data collection and analysis, and a description of the human subjects protection efforts that were employed.

## *Purpose and Research Questions*

The purpose of this study was to examine nurse educator and nursing student perceptions of the best ways to prepare for and implement HFHPS. The research questions for the study were:

1. How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education?
2. To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?
3. To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation experiences?
4. What are associate degree nursing students' perceptions of the experience of high fidelity human patient simulation?

5. What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perceptions of the value and importance of educational best practices and simulation design characteristics?
6. Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high fidelity human patient simulation?
7. What is the relationship between associate degree nursing faculty and nursing students' perceptions of the importance and value of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?

*Design Overview*

A mixed methods triangulation design was used for this study. In this single-phase design, the researcher implemented qualitative and quantitative methods concurrently with equal weighting for each method (Creswell & Plano Clark, 2007). Qualitative and quantitative data were collected and analyzed separately to most clearly understand the research problem. The data from each method were merged in the interpretation phase. The rationale for this approach was to compare and contrast, or validate the results from the qualitative and quantitative findings (Creswell & Plano Clark). For this study, mixed methods were appropriate because there is little research on teachers' and students' perceptions of what constitutes best practices in HFHPS. Qualitative data from teachers and students provided a richness

of detail about these perceptions that is not currently available, while the quantitative measures provided another method of discerning perceptions, which strengthened construct validity (Shadish, et al., 2002).

The quantitative portion of the study used a descriptive correlational design to assist in answering research questions 2, 3, 4, 5, and 7. Instruments measuring teacher and student participants' perceptions of educational practices and simulation design characteristics were used. Learner self-confidence and satisfaction with the HFHPS experience were also measured. Quantitative data were analyzed for the presence of relationships between teacher and student perceptions.

Open-ended written survey questions for both groups of participants were used to collect qualitative data about educational practices and design elements the participants believed to be important. Both of these types of data were used to determine teacher and student participants' perceptions of the educational practices and design elements in the HFHPS. Qualitative data from both groups were compared for common themes or patterns. Table 1 summarizes the research questions, data source and method of collection, measurement, reliability, and methods of data analysis.

Table 1

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| 1. How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education? | ADN faculty; collected via secure website | Teacher Open-ended questionnaires | Qualitative analysis |
| 2. To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education? | ADN faculty; collected via secure website | 1) Educational Practices in Simulation Scale – Teacher Version (EPSS-T) | Descriptive statistics |
| | | 2) Simulation Design Scale Teacher Version (SDS-T) | Descriptive statistics |

Table 1 – Continued

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| 3. To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation Experiences? | ADN students; collected via secure website | 1) Educational Practices in Simulation Scale - Student Version (EPSS-S) 2) Simulation Design Scale - Student Version (SDS-S) | Descriptive statistics – higher mean and median scores indicate greater degree of perception of the characteristic measured. |
| 4. What are associate degree nursing students' perceptions of the experience of high fidelity human patient simulation? | ADN students; collected via secure website | 1) Student Open-ended questionnaire | Qualitative analysis – comparison with descriptive statistics of quantitative |

Table 1 – Continued

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| | | | instruments for congruency. |
| | | 2) EPSS-S<br>Reliability: Alpha - Presence of Practices: .86<br>Importance of Practices: .91 | Descriptive statistics |
| | | 3) SDS-S<br>Reliability: Alpha - Presence of Practices: .92<br>Importance of Practices: .96 | Descriptive statistics |
| | | 4) Student Satisfaction with Learning (LSS) | Descriptive statistics |

Table 1 – Continued

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| | | Reliability: Alpha – .94<br>5) Student Self-Confidence In Learning (LSCS)<br>Reliability: Alpha - .87 | Descriptive statistics |
| 5. What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perceptions of the presence and importance of educational best practices and | ADN students; collected via secure website | 1) EPSS-S<br>2) SDS-S<br>3) LSS<br>4) LSCS | Spearman's rho correlations for presence, strength, and direction of relationships |

Table 1 – Continued

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| simulation design characteristics? | | | |
| 6. Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high fidelity human patient simulation? | ADN faculty and students; collected via secure website | 1) Teacher Open-ended questionnaire<br>2) Student Open-ended questionnaires | Comparison of patterns and themes from qualitative analysis of the two questionnaires |
| 7. What is the relationship between associate degree nursing faculty and nursing students' | ADN faculty and students collected via secure | 1) EPSS-T<br>2) SDS-T<br>3) EPSS-T<br>4) SDS-S | Descriptive statistics |

Table 1 – Continued

*Summary of Research Questions and Data Collection Methods*

| Research Question | Data Source and Method | Method of Measurement - Instrument | Method of Data Analysis |
|---|---|---|---|
| perceptions of the importance and presence of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences? | | | |

*Note.* All instrument reliabilities included in the table were established by Jeffries and Rizzolo (2006).

All data were collected via the internet through a secure site set up through the University of Kansas School of Nursing. Different links to the site were given to student and teacher participants to facilitate completion of the appropriate instruments for each group.

*Study Setting and Sample*

Data were collected from five community colleges in Kansas, Missouri, Oklahoma, and Virginia. Each college has a two-year ADN program accredited by the National League for Nursing Accrediting Commission and has embedded

simulation in the curricula. The simulation coordinators at each site provided letters indicating agreement that the site may be used for data collection (Appendix A). Approval for the study was obtained from each site prior to beginning data collection.

These sites were chosen because they each have nursing simulation laboratories that are similarly equipped and staffed. Controlling variability in the facilities and the kind of high fidelity simulators used in the HFHPS decreases influences that could impact teacher and student participants' responses on the measurement instruments and confound the findings (Shadish, et al., 2002).

The Human Patient Simulator Laboratory (HPSL) at the Metropolitan Community College (MCC) Penn Valley location has six human patient simulators (HPS) – two adult HPS, two emergency care HPS, and two pediatric HPS. The Healthcare Simulation Center (HSC) at Johnson County Community College contains eight HPS – five adult simulators, one pediatric simulator, and two birthing simulators. The Virtual Hospital at Germanna Community College in Locust Grove, Virginia is equipped with six HPS – four adults, one pediatric, and a birthing simulator. The simulation laboratory at Tulsa Community College in Oklahoma houses four adult simulators, one pediatric simulator, and one birthing simulator. The simulation laboratory at St. Louis Community College has three adults, one pediatric, and one birthing simulator.

All sites have two or more dedicated simulation rooms featuring one-way mirrors that allow faculty to observe students during a HFHPS scenario. Rooms are

equipped with physiologic monitors for the simulators, resuscitation carts, and other supplies needed for realistic patient care. Separate nursing stations and areas for medication retrieval and set-up are also available. Each site has the ability to video-record students during HFHPS experiences for later review by students and teachers.

The study used a purposive convenience sample of associate degree nursing (ADN) students and nursing faculty who have participated in HFHPS. The lack of research on the use of HFHPS in associate degree nursing education justified drawing the study sample from this population. Furthermore, the greater use of HFHPS by ADN programs and the fact that the majority of nursing graduates come from these programs amplifies the significance of research involving this population.

*Sampling plan.* All nursing faculty at each site who participated in HFHPS were eligible for the study. All nursing students who had reached the age of consent (St. Louis University Institutional Review Board, 2007; University of Kansas Medical Center Office of Compliance for Research, 2007) and were participating in HFHPS at each site were eligible for the study. Each site had the potential for three to five teacher participants and 30 to 70 student participants, for potentially, a total of 15-25 teachers and 150-250 students. This sampling procedure was chosen to allow for the largest potential participant pool from the nursing program at each site, which would give wider applicability to the study findings and enhance external validity (Shadish, et al., 2002). In addition the sample size for teacher participants was planned to attempt to reach saturation in the data, as that was the goal of the study's qualitative research (Lincoln & Guba, 1985; Munhall, 2007). Selection of a diverse

sample of student and teacher participants and thick, rich description in the research report enhances transferability of the findings (Lincoln & Guba, 1985).

The quantitative data collected from student participants for Research Question 5 were used to determine if statistically significant relationships existed between the variables of learner self-confidence, learner satisfaction, educational practices, and simulation design characteristics. Power analysis indicated a final sample size of 80 was needed to demonstrate statistically significant relationships using a Type I error rate of .05 and a Type II error rate of .20 with a moderate effect size (Cohen, 1992).

*Recruitment of participants.* The University of Kansas Medical Center (KUMC) Institutional Review Board (IRB) reviewed the proposal for approval that appropriate procedures for informed consent and Human Subjects protection were followed. Preliminary consultation with a KUMC IRB Administrator indicated this study qualified for exempt status under human subjects protection guidelines and therefore did not require a formal consent form from participants. However, the study recruitment letter stated that accessing the survey indicated consent (University of Kansas Medical Center Office of Compliance for Research. 2007).

After all approvals were received from the KUMC IRB and the participating colleges, the researcher sent the simulation lab director at each site separate emails that were forwarded to students and teachers respectively. The forwarded emails to teachers and students consisted of letters containing the appropriate website link for each group (Appendices B and C), which explained the purpose of the study, the

teachers' and students' roles in it, potential risks and benefits, confidentiality requirements, and the option for non-participation without penalty of any kind. Follow up emails to students and teachers containing the appropriate website link were forwarded by the simulation lab directors two weeks after the original email. The follow up emails reminded potential participants about the initial request for their participation, and contained the original letters (Appendices B and C) found in the first email.

Additionally, student letters emphasized the confidential nature of all data collected and that the study was in no way associated with students' course work or grades. Both letters stated that further information and answers to any questions were available through the researcher contact information listed in the letter. Study participants were able to download and print a copy of the letter.

To facilitate participants' completion of the appropriate questionnaires, teacher letters contained a link to the secure web-based questionnaires for teacher participants. Student letters contained a link to the secure web-based questionnaires for student participants.

*Data Collection*

*Data collection instruments.* The researcher developed demographic questionnaires to describe the samples of teacher and student participants. Appendices D and E show the information collected.

The four measurement instruments used with student participants in this study were developed for use in the National League for Nursing/Laerdal joint

research study on the use of simulation in nursing education (Jeffries & Rizzolo, 2006). The development of these instruments was an iterative process that began in Phase I of the study with a comprehensive literature review and search for existing instruments that would meet the needs of the study. Because no instruments were found that were adequate for use in the study, experts in simulation design and educational practices collaborated to create the initial versions of each instrument, which were used in Phase II of the study.

Analysis of the Phase II data from each instrument lead to revision of the instruments by the originators with the goal of improving reliability and validity. In Phase III and again in Phase IV of the study, reliability and validity were assessed using the current forms of the four instruments (Jeffries & Rizzolo, 2006). Six other published studies (Childs & Sepples, 2006; Dobbs, et al., 2006; Fountain & Alfred, 2009; Hoadley, 2009; Kardong-Edgren, et al., 2008; Smith & Roehrs, 2009) reported use of these instruments, however only Fountain and Alfred reported reliabilities for any of the instruments. In their study, Fountain and Alfred reported internal consistency reliabilities of the LSS (.91) and LSCS (.84) using Cronbach's alpha.

The Educational Practices in Simulation Scale-Student Version (EPSS-S) (Appendix F) is a 16-item instrument using a five-point rating scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree) for the presence of educational best practices. Possible scores range from 16 to 80. The importance of the educational practices is rated with a five-point scale (5 = Very Important, 4 = Important, 3 = Neutral, 2 = Somewhat Important, 1 = Not Important) with possible

scores ranging from 16 to 80. Higher scores indicate a greater presence of the educational practices measured and a greater value placed on these practices by the learner. The EPSS-S took approximately seven minutes to complete.

The EPSS-S was designed to measure the presence and importance to the learner of best educational practices, which are based on Chickering and Gamson's (1987) research on best practices in undergraduate education. Ten nurse experts reviewed the instrument for content validity (Jeffries & Rizzolo, 2006). Construct validity was supported through factor analysis using data collected in Phase II of the NLN/Laerdal study, which supported collapsing the educational practices into four components - active learning (10 items), collaboration (2 items), diverse ways of learning (2 items), and high expectations in teacher-developed simulations (2 items) (Jeffries & Rizzolo).

Internal consistency reliability for the presence of the educational practices was .86 using Cronbach's alpha and .91 for the importance placed on these practices (Jeffries & Rizzolo). For a newly developed instrument such as this one, these values were considered quite adequate (Ferketich, 1990). Internal consistency reliabilities for the individual scale components of active learning, collaboration, diverse ways of learning, and high expectations were not reported.

The Simulation Design Scale-Student Version (SDS-S) (Appendix G) is a 20-item instrument using the same five-point scales as the EPSS-S with a possible score range of 20 to 100 for both presence and importance of the simulation design elements. It evaluated five design features of simulations as described in the nursing

education simulation framework – objectives (5 items), support (4 items), problem solving (5 items), feedback (4 items), and fidelity (2 items) (Jeffries, 2005). This two-part instrument asked whether specific design features were present in the simulation and measured how important the features were to the learner. Higher scores indicated a greater presence of the design features and a greater value placed on these features. The SDS-S took approximately 10 minutes to complete.

Ten content experts in simulation development and testing endorsed content validity for the SDS-S, which was considered an acceptable method (Waltz, Strickland, & Lenz, 2006). Cronbach's alpha, indicating internal consistency reliability, was .92 for the presence of features and .96 for the importance of features (Jeffries & Rizzolo, 2006). Individual internal consistency reliabilities for the five design elements – objectives, support, problem solving, feedback, and fidelity were not reported.

The Student Satisfaction with Learning Scale (LSS) (Appendix H) measures student satisfaction with five different items that relate to the simulation experience. The eight item Self-Confidence in Learning Using Simulations Scale (LSCS) (Appendix H) measures students' confidence related to the knowledge and skills used to care for the patient during the simulation scenario. Both scales use a five-point rating scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree). A score range of 5 to 25 is possible for the Student Satisfaction with Learning Scale. Higher scores are a sign of greater satisfaction with the simulation experience. The Self-Confidence in Learning Using Simulations Scale

has a score range of 8 to 40. Greater self-confidence is indicated by higher scores. Completion time for each instrument was approximately three minutes.

Nine clinical experts validated the content and relevance of each item on the LSS and the LSCS. Cronbach's alpha was used to test reliability for each instrument. For the LSS, reliability was supported at .94 while the LSCS reliability was .87 (Jeffries & Rizzolo, 2006). For newly developed instruments such as these, both values were considered adequate (Ferketich, 1990).

For the qualitative portion of the study, the student participant questionnaire (Appendix I) had four open-ended survey questions: 1) How were you expected to prepare for the simulation? 2) What information is important for your nursing faculty to provide before you begin a simulation experience? 3) What did you like best about the simulation? 4) What did you like least about the simulation?

The two measurement instruments used with teacher participants were developed to measure the degree to which teachers use and value NESF educational best practices and simulation design elements in HFHPS to answer research question #2. In addition, examination of the descriptive statistics derived from the data for these instruments allowed determination of the relationship between teachers' and students' perceptions of important simulation characteristics, which assisted in answering Research question #7.

The researcher adapted the instruments from the Educational Practices in Simulation Scale – Student Version and the Simulation Design Scale – Student Version, using recommendations from the developer of the original instruments (P.R.

Jeffries, personal communication, October 20, 2008) and with approval from the NLN. The recommendation for modifying the EPSS-S for use with faculty was to make each item relate to the faculty perception (P.R. Jeffries, personal communication, October 20, 2008). In doing so, item #4 on the EPSS-S was expanded into two items on the Educational Practices in Simulation Scale – Teacher Version (EPSS-T) (Appendix J). On the EPSS-S, item #4 measured the learner perception of the opportunity in the simulation to know if he or she clearly understood the content covered. For the EPSS-T, item #4 measured the teacher perception of the learner's opportunity to know if the content covered was clearly understood. Item #5 on the EPSS-T measured the teacher perception of his or her opportunity to find out if students clearly understood the material in the simulation. All other items on the EPSS-T were either worded identically to the EPSS-S or restated the item from the teacher's perspective as recommended.

The EPSS-T is a 17-item instrument using a five-point rating scale (5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2= Disagree, 1 = Strongly Disagree) for the presence of educational best practices with possible scores ranging from 17 to 85. The importance of the educational practices is rated with a five-point scale (5 = Very Important, 4 = Important, 3 = Neutral, 2 = Somewhat Important, 1 = Not Important) with possible scores ranging from 17 to 85. The instrument measured the presence and importance to the teacher of active learning, collaboration, diverse ways of learning, and high expectations in teacher-implemented simulations. Higher scores indicated a greater presence of the educational practices measured and a greater

value placed on these practices by the teacher. The EPSS-T took approximately seven minutes to complete.

The Simulation Design Scale-Teacher Version (SDS-T) (Appendix K) was modified from the SDS-S as recommended (P.R. Jeffries, personal communication, October 20, 2008) to present the items from the teacher's perspective. The SDS-T is a 20-item instrument using the same five-point rating scales as the EPSS-T with a possible score range of 20 to 100 for both the presence and importance of the simulation design elements. The same design features were evaluated in the SDS-T as in the SDS-S. This two-part instrument asked whether specific design features were present in the simulation and measured how important the features were to the teacher. Higher scores indicated a greater presence of the design features and a greater value placed on these features. The SDS-T took approximately 10 minutes to complete.

The teacher participant open-ended questionnaire contained eight survey questions (see Appendix L). Five questions asked about practices teachers use to prepare for and implement HFHPS. Three questions related to reasons for using HFHPS, and the advantages and drawbacks associated with it.

*Data collection procedures.* Potential student and teacher participants received recruitment letters describing the study (Appendices B & C). All data were collected via the internet through a secure site set up through the University of Kansas School of Nursing. Separate links to the site were provided in the

recruitment letters for student participants and teacher participants to facilitate completion of the appropriate instruments for each group.

Upon reaching the data collection website, participants were asked to indicate electronically their consent to participate by proceeding to the web page for the study questionnaires. They were also able to download and print a copy of the recruitment letter. There were no anticipated risks to students or teacher participants from involvement in this study.

Teacher participants first answered the demographic questionnaire. The open-ended questionnaire was administered next, followed by the SDS-T and the EPSS-T. Student participants responded to the demographic questionnaire first, followed by the open-ended questionnaire. The SDS-S, EPSS-S, the LSS, and the LSCS were administered in that order.

The open-ended questionnaires were given before the quantitative instruments in an effort to encourage more detailed answers to the survey questions. The quantitative instruments were administered in the order of decreasing numbers of items. As participant response burden rises with each subsequent instrument administered, the likelihood of missing or less in-depth responses also rises (Shadish, et al., 2002). While the total number of items on the instruments was less than 50, it was still a concern when asking for a time commitment from participants without any kind of an incentive (Edwards, Roberts, Clarke, DeGuiseppi, Wentz, et. al., 2002).

*Reliability and Validity of Quantitative Measures*

Higgins and Straub (2006) stated that review of the literature, personal reflection, and analytical critique by experts are methods for evaluating content validity. Experts endorsed content validity for the Educational Practices in Simulation Scale – Student Version, the Simulation Design Scale – Student Version, Student Satisfaction with Learning Scale, and the Self-Confidence in Learning Using Simulations Scale prior to their use in the NLN/Laerdal study (Jeffries & Rizzolo, 2006).

The teacher versions of the Educational Practices in Simulation Scale and the Simulation Design Scale were intended to be assessed for content validity by three experts in the areas of simulation prior to the beginning of the study as recommended by Lynn (1986). The experts' experience with simulation ranged from 7-10 years and their experience as nursing educators ranged from 15-25 years. One expert was not able to complete the content validity assessment within the desired time frame.

The remaining two experts had the same range of simulation and nursing education experience stated previously. Both experts received the objectives underlying each instrument's construction, the definitions of each instrument's components, and the items for each instrument. Information for each instrument was sent separately to reduce potential confusion as to which instrument the objectives, definitions, and items were associated.

The experts used a four point scale of 1) not relevant, 2) somewhat relevant, 3) quite relevant, and 4) very relevant to rate each item's relevancy to the

instruments' objectives as suggested by Lynn (1986). The item content validity index (I-CVI) was then calculated by dividing the number of experts who rated an item as either quite relevant or very relevant by the total number of experts (Lynn; Waltz, et. al, 2005). The scale content validity index (S-CVI) for each instrument was calculated by dividing the number of items rated as either quite relevant or very relevant by the total number of items on the instrument (Lynn, 1986).

Cronbach's alpha was calculated for each instrument from the study data to determine internal consistency reliability. These are acknowledged methods for determining validity and reliability of study instruments (Waltz, et al., 2006).

*Trustworthiness of Qualitative Data Analysis*

The trustworthiness of all qualitative data analysis was evaluated according to Lincoln and Guba's (1985) criteria of credibility, dependability, confirmability, and transferability. There are several acceptable methods that can be used to demonstrate each criterion.

Prolonged engagement, persistent observation, triangulation, and peer debriefing are accepted ways to support credibility (Lincoln & Guba, 1985). In preparation for this study, the researcher studied the phenomenon of HFHPS by visiting simulation laboratories in various states to understand the operation of the manikins and related equipment as well as the process of the HFHPS experience. The researcher observed students participating in HFHPS and post-simulation debriefing, and was also a participant in a HFHPS experience. The researcher also implemented and evaluated simulation experiences with nursing students in two

courses she taught. A prolonged period of engagement as described above contributed to credibility because the researcher learned the context from which the qualitative data were generated (Lincoln & Guba).

The experience of participating in a HFHPS and observing a post-simulation debriefing is a form of persistent observation that contributed to the development of the open-ended survey questions for teacher and student participants. The researcher's notes from these experiences assisted the researcher in determining salient themes and patterns during data analysis The researcher used triangulation in the study by asking similar open-ended survey questions of the student and teacher participants, and comparing their different perspectives on how best to prepare for and implement HFHPS.

During the data analysis the researcher and dissertation chair met to discuss the themes the researcher found in the data. Peer debriefing was used to help the researcher stay aware of her own biases in terms of the meaning of the data and the processes used for analyzing the data. The peer debriefer reviewed a random sample of uncoded data for students and at a later time for teachers, and coded each set of data based on the major themes discerned by the researcher. The peer debriefer also served as a sounding board to assist the researcher in seeing other perspectives in the data and to provide encouragement to the researcher during the analysis process.

Dependability for this study was supported through the researcher's audit trail that depicts the reasoning and methods used by the researcher during the study.

The audit trail can be traced back for nearly two years to the researcher's first attendance at a simulation workshop. The researcher kept notes about the information gained, and her insights and opinions during the process. The researcher continued to keep track of the process through her field notes on how decisions were made for the coding and analysis of the data into preliminary and final themes, and the emerging interpretations to their final form.

Confirmability adds to trustworthiness in qualitative research by tying together the data collected with the researcher's interpretation. The researcher maintained a reflexive journal of her biases and thoughts for over a year as part of the audit trail described by Lincoln and Guba (1985). The triangulation in the study provided by asking similar open-ended survey questions of students and teachers also contributed to confirmability.

The researcher used thick, rich description of the student and teacher participant responses to capture the essence of common themes found in the data for each group. Describing the data in this manner brought to life the perceptions of students and teachers who had experienced HFHPS and as Lincoln and Guba (1985) suggested, will allow readers to judge the transferability of the results, thus contributing to trustworthiness of the study.

*Data Management*

Data were collected via a secure internet website and went directly into a database. The database resided on a secure network drive on the University of

Kansas School of Nursing network. All data stored on a computer were password protected.

*Data Analysis*

The Statistical Package for the Social Sciences – SPSS Version 16.0 (SPSS, 2007) was used for all quantitative data analysis. Data cleaning to check for errors in data entry was performed prior to analysis. The percent of data missing was evaluated to determine the type of missing data management necessary (Fox-Wasylyshyn & El-Masri, 2005). Analysis of the qualitative and quantitative data is described in detail below.

*Demographic information.* Descriptive statistics for the teacher and student samples were calculated using data from the demographic questionnaires (Appendix D and E). An item on the demographic questionnaire identified the participant's college so that descriptive statistics for each college by teacher or student group could be determined.

*Research question #1: How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education?* Marshall and Rossman (2006) described seven phases in the analysis of qualitative data – organizing the data, immersion in the data, generating categories and themes, developing beginning interpretations, seeking alternative explanations, and writing the report. The researcher cycles through each phase numerous times and through this process data reduction takes place as the researcher finds the meaning in the participants' responses (Marshall & Rossman).

For this research question, the researcher used an iterative process to analyze the responses on the teacher open-ended questionnaires to discover major themes and patterns related to teacher preparation for and implementation of the HFHPS experience. Themes and specific passages were identified for inclusion in the narrative as thick, rich description. The researcher also searched for linkages between the themes as the meaning of each theme was interpreted. As previously described, the researcher met with the dissertation chair to discuss themes found in the data. She also used a peer debriefer to promote awareness of researcher bias in the analysis and to validate coding of the data to themes from the analysis.

*Research question #2: To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?* Descriptive statistics were used to analyze the data from the EPSS-T and SDS-T. Examination of the distribution of item and total scores revealed the sample did not meet the criteria for a normal distribution. As a result, the mean and median for the EPSS-T and SDS-T instruments and their constituent components were both examined in this study.

Scores for the EPSS-T and SDS-T on the importance and presence scales were examined to determine the degree to which the teacher participants perceived the presence and importance of NESF educational practices and simulation design characteristics. Higher mean and median scores indicated a greater degree of perception of the presence and importance of educational practices in the HFHPS experience as described in the NESF.

Jeffries (2005) stated that the educational practices and design elements described in the NESF were drawn from Chickering and Gamson's (1987) best practices in undergraduate education. Thus the scores on the EPSS-T and the SDS-T indicated teacher participants' perceptions of the presence and importance of educational best practices in the HFHPS.

*Research question #3: To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation experiences?* Examination of the data from the EPSS-S and SDS-S revealed a skewed distribution. Therefore, both mean and median scores for the EPSS-S and SDS-S on the importance and presence scales were examined to determine the degree to which the student participants perceived the presence and importance of NESF educational practices and simulation design characteristics. While the EPSS-S and SDS-S have been used in several studies (Childs & Sepples, 2006; Comer, 2005; Dobbs, et al., 2006; Starkweather & Kardong-Edgren, 2008), only Kardong-Edgren, et al. (2008) reported scores from these instruments.

For the three simulations in their study, mean scores on the presence scale of the EPSS-S were 71 +/- 6, 69 +/- 9, and 71 +/- 8, respectively, which was interpreted to mean students perceived that best practices were used in each simulation (Kardong-Edgren, et al., 2008). The scores on the importance scale for the EPSS-S for the same simulations were 73 +/- 7, 72 +/- 8, and 73 +/- 7, and were inferred to indicate the students placed high importance on best practices (Kardong-Edgren, et al.).

Scores on the SDS-S for the presence of best simulation design elements as defined in the NESF were 90 +/- 7, 83 +/- 12, and 88 +/- 8 for the three simulations. The importance scores for the SDS-S were 90 +/- 6, 93 +/- 7, and 89 +/- 9. Kardong-Edgren,et al. (2008) interpreted this as signifying that best simulation design elements were highly present in the simulations and that students found them to be very important.

Based on the study by Kardong-Edgren, et al., for the purposes of this study, higher mean and median scores on the EPSS-S indicated a greater degree of perception of the presence and importance of educational best practices in the HFHPS experience. Higher means scores on the SDS-S inferred a greater presence and importance of best simulation design elements.

*Research question #4: What are associate degree nursing students' perceptions of the experience of high fidelity human patient simulation?* Descriptive statistics calculated for research question #3 were used in the analysis for this question. As stated earlier, higher mean scores indicated a greater degree of perception of the presence and importance of educational best practices in the HFHPS experience.

Data from the Student Satisfaction in Learning Scale (LSS) and the Self-Confidence in Learning using Simulations Scale (LSCS) were also used. Examination of the LSS and LSCS data revealed a skewed distribution. Descriptive statistics from the LSS and the LSCS, including the mean and median scores were calculated for use in the data analysis for this research question.

Fountain and Alfred (2009) reported mean satisfaction with simulation scores of 23 (3.0). Kardong-Edgren, et al. (2008) reported LSS mean scores for the three simulations in their study were 21 +/- 2, 22 +/- 3, and 24 +/- 1, while LSCS mean scores were 38 +/- 2, 35 +/- 3, and 38 +/- 2. Kardong-Edgren, et al. stated these scores indicated high student satisfaction and self-confidence, which is supported by the fact that the range of possible scores for the LSS and LSCS, respectively, is 5 to 25 and 8 to 40.

Therefore, for this study higher mean scores for the LSS instrument signified the student participants experienced overall satisfaction with the HFHPS experience. Higher mean and median scores on the LSCS indicated above average self-confidence after the HFHPS experience. As learner self-confidence was not measured prior to the HFHPS, it was not possible to determine whether a participant's self-confidence changed as a result of the HFHPS. Interpretation of the data for self-confidence was limited in this respect.

Responses to the student participants' open-ended questionnaires were analyzed and coded for preparation expectations, information needed before beginning the simulation experience, what was most liked and least liked about the simulation, and other emerging themes. The analysis consisted of an iterative process of data analysis similar to the one described for research question #1, which included input from the dissertation chair and peer debriefer.

The coded data were compared to the student participants' perceptions of the educational practices and simulation design characteristics contained in the NESF as

measured by the EPSS-S and SDS-S. The degree of learner satisfaction and learner self-confidence as derived from the mean and median scores of the LSS and LSCS were also compared to the qualitative data. The purpose was to gain insight into the reasons for the levels of satisfaction and self-confidence reflected in the student participants' mean and median scores. Comparison of the qualitative data with the data from the EPSS-S, SDS-S, LSCS and LSS provided triangulation of data as part of the mixed methods design (Creswell & Plano Clark, 2007).

*Research question #5: What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perceptions of the value and importance of educational best practices and simulation design characteristics?* Parametric test statistical assumptions regarding the level of measurement, distribution, and homogeneity of variance were assessed from the pragmatist view, which allows analysis of ordinal level data (Nunnally & Bernstein, 1994; Waltz, et al, 2005). The data were found to be skewed, which did not meet the assumption of a normal distribution. For that reason, non-parametric statistics were used in the analysis for this research question.

Box plots and frequencies of the data for each instrument were examined for the presence of outliers, which could skew the results. Twenty-one participants had responses that were outliers on the EPSS-S, the SDS-S, the LSS, and the LSCS. Cases were examined to determine if outlier scores fell randomly within the data or were clustered within a particular study site or sites. Outliers clustered within one

site may indicate the presence of other influencing factors beyond the control of the study design, which is a threat to statistical conclusion validity (Shadish, et. al., 2002). A detailed description of the outliers' characteristics is presented in the results. Addressing student participants' questions and concerns fully was aimed at controlling for dissatisfaction from sources outside the HFHPS experience.

Spearman's rho correlations between the data from the four instruments (EPSS-S, SDS-S, LSS, and LSCS) were calculated due to the skewed distribution and statistically significant relationships were noted (alpha = .05). Interpretation began by determining if statistically significant relationships existed between data from any of the instruments. In the presence of significant relationships, the magnitude and direction of the relationships were next assessed.

According to the NESF (Jeffries, 2005), there is a positive relationship between educational practices and simulation design characteristics, and both concepts are positively related to learner satisfaction and learner self-confidence. Therefore, it was expected that significant positive correlations would exist between the four instruments' scores. Williams and Monge (2001) suggested that correlations of .40 to .70 are moderate and indicate a substantial relationship between the variables while correlations greater than .70 show a marked relationship. Results of this nature would suggest support for the NESF assertion that the use of best educational practices and simulation design characteristics is related to learner satisfaction and self-confidence after a HFHPS experience.

*Research question #6: Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high-fidelity human patient simulation.* Comparisons of the themes and patterns found in the content analysis of open-ended questionnaires from student and teacher participants were made to determine whether student and teacher participants had similar perceptions of HFHPS. The peer debriefer examined the themes for each group of participants and gave feedback on similarities and differences in the themes for the two groups.

*Research question #7: What is the relationship between associate degree nursing faculty and nursing students' perceptions of the importance and presence of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?* The researcher had originally planned to calculate correlations between teacher and student participants' scores on the EPSS-S, SDS-S, EPSS-T, and SDS-T to answer this research question. However, the large disparity in the size of the two groups (teacher N = 12, student N = 140) limited the usefulness of this statistic as relationships would only be calculated between 12 pairs of participants. Depending upon which 12 student participants' data were used, the results of the correlations with the 12 teacher participants' data could be very different. Additionally, strong correlations can be obtained more easily in smaller sample sizes, but are less likely to be statistically significant (deVaus, 2002).

As earlier defined in this study, higher scores on the EPSS-S, SDS-S, EPSS-T, and SDS-T indicated a greater degree of perception of the presence and importance of educational best practices and simulation design characteristics

included in the NESF. A straightforward approach to answering the research question was to examine the descriptive statistics for the teacher and student participant groups.

Means and medians for the EPSS-S, SDS-S, EPSS-T, and SDS-T and their constituent components were categorized as High or Low. The High category was defined as a mean and median value above the middle ranking score of three on the instruments' five-point rating scale. The EPSS and SDS Importance scales for both teachers and students described three as Neutral. On the EPSS and SDS Presence scales three was described as Undecided. The Low category was defined as a mean and median value below the middle ranking of three on the instruments' five point rating scale.

Assessment of the categorical results as well as side by side comparisons of the actual mean values for teacher and student participants on each of the instruments' and their constituent components was made to determine the relationship between student and teacher perceptions of the importance and presence of best educational practices and simulation design characteristics in HFHPS. The means, medians, and categorical results for student and teacher participants from the same study site were also compared to provide further depth in answering the research question.

*Ethical Considerations*

Prior to beginning data collection, the researcher completed the University of Kansas Medical Center Tutorial for Human Subjects Protection and the University of

Kansas Medical Center Tutorial for HIPPA. These training programs informed the researcher of the responsibilities incurred by the principles of ethical research conduct to promote the welfare of research participants, to practice confidentiality regarding participants, and to uphold legal and ethical requirements related to protected health care information.

All data collected were maintained in a secure manner. Data stored in computer files were password protected. There were no anticipated risks or direct benefits to study participants. Potential participants received a letter explaining the study and had the opportunity to have their questions answered prior to agreeing to participate in the study. Students were informed in the letter that participation in the study was in no way connected to their nursing program courses and any information they provided was confidential and not accessible by any of their nursing faculty. Additionally, vigilant data analysis ensuring authenticity was maintained.

*Summary*

The study used a mixed methods approach to answer the seven research questions. Using both qualitative and quantitative data to answer the research questions strengthened the study by allowing each method to compensate for limitations present in the other. A descriptive correlational approach was used for the quantitative portion of the study. Qualitative data were examined through an iterative content analysis process.

Similarly equipped simulation laboratories at five community colleges with ADN programs served as the sites for the study to help control for differences that

could confound the findings and decrease internal validity. The student participant sample consisted of ADN students who had participated in a HFHPS. Teachers in the ADN programs participating in this study who had used HFHPS with students were eligible for the study.

Appropriate approval from the University of Kansas Medical Center Institutional Review Board was secured prior to beginning the study. Each site also gave approval before data collection began. Participants gave implied consent by accessing the online study questionnaires.

To facilitate participation in the study, each site's simulation center director contacted potential student and teacher participants at the sites via an email containing information about the study and a link to the study's data collection websites for student and teacher participants.

Student participants completed a demographic questionnaire, a four item open-ended questionnaire, and the SDS-S, EPSS-S, LSS, and LSCS instruments in that order to facilitate more complete responses to each item. Teacher participants completed a demographic questionnaire, an eight-item open-ended questionnaire, and the SDS-T and EPSS-T in the order they are listed for the same reason.

Qualitative data were analyzed using an iterative process appropriate for qualitative inquiry to find patterns and themes in the data from student and teacher participants. Quantitative data were analyzed using SPSS 16.0. Descriptive statistics were used to determine student and teacher participants' perceptions of the value and presence of educational best practices in the HFHPS. Student participants'

data were used to analyze the relationships between the variables of educational practices, simulation design characteristics, learner self-confidence, and learner satisfaction. Relationships between student and teacher participants' perceptions of educational practices and simulation design characteristics were analyzed to determine whether congruency in their perceptions existed. Study findings were compared to the current literature.

High fidelity human patient simulation is a new clinical model recently adopted in nursing education to give nursing students experience with the critical thinking and decision making required to provide high quality care to patients with complex health care needs. Early research in the area of HFHPS showed that students are satisfied with and more confident after simulation experiences. However, little research was available on ADN programs, which contribute more new graduates to the registered nurse population and have been shown to use HFHPS for more hours than BSN programs Furthermore, there was little in the literature about how nursing faculty implement HFHPS and whether they are using best educational practices.

This study used the innovative approach of examining how nursing faculty implement HFHPS from the perspectives of ADN faculty and students. Collection and analysis of qualitative and quantitative data from students and faculty who have experience with HFHPS is significant because it provides a multidimensional description of how HFHPS is implemented, which can be used to inform faculty development for the most effective use of HFHPS in nursing education.

# Chapter Four: Results

## *Introduction*

The purpose of this study was to examine nurse educator and nursing student perceptions of the best ways to prepare for and implement high fidelity human patient simulation (HFHPS). The research questions were answered using a mixed methods design which yielded qualitative and quantitative data. The data analysis was carried out with rigorous attention to the standards of both quantitative and qualitative research methods. The samples of teacher and student participants are described in this chapter, and results for each research question are provided.

## *Sample*

### *Teacher Sample*

Eighteen teachers accessed the survey and completed the demographic information. Six did not complete any other part of the online survey instruments and are described separately from the sample.

Germanna Community College in Virginia (site A), St. Louis Community College (site B), and Penn Valley Community College in Kansas City (site C) each had one teacher who completed only the demographic data. Johnson County Community College (site D) had two teachers who only completed demographic data. One teacher from Tulsa Community College also completed demographic information only. The mean age of these teachers (51.4 years) was greater than the sample, but the mean full time employment in nursing education (12.8 years) was identical to the sample. Three of the teachers were masters prepared, one had a

baccalaureate degree in nursing, and one was doctorally prepared. The mean years of experience with simulation (4.2) was slightly higher than the sample mean.

The remaining 12 participants in the teacher sample, all of whom were female, had a mean age of 45. 9 years, with a range of 32 to 55 years, which is less than the national average of 55 years for nursing faculty (AACN, 2008a; NLN, 2007). Three participants were from Germanna Community College in Virginia (site A), two from St. Louis Community College (site B), two from Penn Valley Community College in Kansas City (site C), and five from the Johnson County Community College nursing program (site D).

Nine of the participants were full-time faculty who had been teaching for a mean of 12.8 years. The three part-time faculty participants had been teaching a mean of 2.7 years. Nine participants were masters prepared nurses, two had baccalaureate in nursing degrees, and one was doctorally prepared.

The teacher sample participants had a mean of 3.7 years of experience with HFHPS, with a range of six months to 10 years of experience. Teacher participants reported using HFHPS in obstetrics, pediatrics, fundamentals, medical-surgical, critical care, mental health, and management nursing courses.

The mean age and mean years in nursing education for site C participants was somewhat less than participants from the other three sites. However, mean years of experience with simulation was similar at all sites. Table 2 breaks down teacher participant characteristics by study site.

Table 2

*Teacher Participant Demographic Characteristics by Study Site*

| Study Site | n | Mean Age In Years (SD) | Age in Years Range | Mean Years In Nursing Education (SD) | Years in Nursing Education Range | Mean Years Experience With Simulation (SD) | Years Experience With Simulation Range |
|---|---|---|---|---|---|---|---|
| Site A | 3 | 46.7(8.74) | 37-54 | 9.0(13.86) | 1-25 | 2.3(2.31) | 1-5 |
| Site B | 2 | 50.0(2.83) | 48-52 | 10.0(8.49) | 4-16 | 6.0(5.66) | 2-10 |
| Site C | 2 | 36.5(3.54) | 34-39 | 4.0(0.0) | 4 | 2.0(0.0) | 2 |
| Site D | 5 | 45.2(11.21) | 32-55 | 20.5(7.78) | 15-26 | 3.67(0.58) | 3-4 |

*Student Sample*

A total of 140 students accessed the survey and answered all or part of the online survey instruments. All are included in the description of the student sample. There were 10 student participants from site A, 12 from site B, 60 from site C, and 58 from site D. No students from Tulsa Community College chose to participate in the study. Two participants (1.4%) were in the first semester of the nursing program, 56 participants (40%) were in the second semester, 39 participants (27.9%) were in the third semester, and 43 (30.7%) participants were in the fourth semester.

There were 11 male and 129 female student participants with an age range of 21to 53 years. In comparison, nationally 12.1% of nursing students are male while 8.5% of this sample was male (NLN, 2006). Student participants were classified into

age groups as Millennials (28 years or younger), Gen-Xers (age 29 - 47 years) or Baby Boomers (age 48 or older) based on the definitions from several authors (Billings & Halstead, 2005; Billings, Skiba, & Connors, 2005; Palloff & Pratt, 2001; Pardue & Morgan, 2008). Thirty-two percent (n=45) of the student sample participants were Millennials; 58% (n=84) were Gen-Xers; 10% (n=14) were Baby Boomers.

Comfort with technology was rated by participants as high, medium, or low with 59% (n=83) rating themselves as high, 32% (n=45) as medium, and 9% (n=12) as low. Correlations between comfort with technology, actual age, and age group using Spearman's rho were .115 and .012, respectively, indicating no relationship between comfort with technology and age (Appendix P). Comfort with technology was weakly correlated with satisfaction with simulation learning (.318) and self-confidence in simulation learning (.337) ($p < .001$). Correlations between actual age, age group, satisfaction, and self-confidence were also non-significant. Actual age correlation with satisfaction using Spearman's rho was -.156, and with self-confidence was -.20. Age group correlation with satisfaction was -.063, and for self confidence was -.086.

The mean number of HFHPS experiences reported by student participants was 7.3 with a range of one to over 20 experiences. HFHPS were used in obstetric, pediatric, medical-surgical, mental health, fundamentals, geriatric, and management courses. Student participants reported experiences with HFHPS that focused on patient scenarios involving the perioperative period, arrhythmias and telemetry,

stroke, diabetes mellitus, chronic obstructive pulmonary disease, blood administration, advanced and beginning assessment, neurological, orthopedic and gastrointestinal problems, end of life care, multiple system organ failure, intensive care unit, acute and chronic renal failure, sepsis, pulmonary embolism, congestive heart failure, and risk management. Table 3 breaks down student participant characteristics by study site.

Table 3

*Student Participant Demographic Characteristics by Study Site*

| Study Site | n | Mean Age In Years (S.D.) | Age In Years Range | Mean Experiences With Simulation (S.D.) | Experiences With Simulation Range |
|---|---|---|---|---|---|
| Site A | 10 | 37.3 (7.30) | 29-48 | 7.3 (5.13) | 1-20 |
| Site B | 12 | 32.2 (11.33) | 21-48 | 1.5 (0.67) | 1-2 |
| Site C | 60 | 34.1 (9.36) | 20-53 | 8.1 (3.64) | 2-20 |
| Site D | 58 | 31.8 (7.72) | 20-53 | 9.1 (4.49) | 2-25 |

*Research Question #1*

How do associate degree nursing faculty prepare for and implement high-fidelity human patient simulation in nursing education?

Teacher participants (N=12) answered five open-ended survey questions (Appendix L) related to research question #1 that provided the qualitative data that were content analyzed for themes. Although there were only 12 responses to each

survey question, the detailed answers provided by the participants resulted in saturation in the data and the opportunity for rich, thick description, which were goals of the study's qualitative research component (Lincoln & Guba, 1985; Munhall, 2007). Table 4 summarizes the themes found in the data.

Table 4

*Teacher Participant HFHPS Preparation and Implementation Themes*

| Preparation Themes | Implementation Themes |
|---|---|
| Learning Environment Readiness | Ensuring Fidelity |
| Readiness to Facilitate Learning | Self-Development |
| Student Readiness | Developing Students' Thinking Skills |

*Preparation for High Fidelity Human Patient Simulation*

Three survey questions were aimed at finding out how teacher participants' prepared for a HFHPS experience. They were:

How do you prepare for a simulation?

What information is it important for you to provide to students before they begin a simulation experience?

How do you orient and prepare students for the simulation experience?

The themes that emerged from the data were Learning Environment Readiness, Readiness to Facilitate Learning, and Student Readiness. Learning Environment Readiness included preparing the manikins, ensuring supplies and other

equipment were in place and operational, and adding “last minute additions to create the most realistic environment”.

Readiness to Facilitate Learning encompassed knowledge of the simulation scenario and learning objectives, and awareness of student characteristics. Teacher participants believed it was important to “consider theory content alignment” with the HFHPS scenario and to “understand how simulation will fit within the curriculum and what objectives you need to cover”. Teacher participants also wanted to “review student strengths and weaknesses” prior to the simulation experience. The theme was encapsulated in this statement, “Review the scenario and be prepared to go where the students’ needs lead”.

One component of Student Readiness was letting students know what to expect in the simulation environment. Many teacher participants described a formal orientation process that included an opportunity for students to learn “what the simulators will do; e.g. speak to you, how they will respond” “because it is essential that you do not confuse the student with the technology”. A clear delineation of each student’s role during the simulation and “the importance of taking simulation seriously” were emphasized. Teacher participants believed it was important that students view the simulation environment as non-threatening and as an opportunity for “learning enhancement”, “so they can use this tool and get the best experience”.

Providing information about the patient and the simulation objectives was another aspect of the Student Readiness theme. One teacher participant stated, “I am a firm believer for beginning practitioners that they do need to have information to

prepare as if they were going to an actual patient assignment." All teacher participants gave students learning objectives and some information about the patient for whom they would be caring, but the amount of information varied. As one teacher stated,

> "At the beginning of the program, the students receive objectives, the patient history, home medications, physicians' orders, and lab/diagnostic values. Each semester, objectives are listed, but the other information is not as in depth. By the last semester, the students receive the objectives, and a paragraph for the patient history without any other information."

In addition, students were assigned critical thinking questions related to the simulation scenario to facilitate students' progress through the scenario. Several teacher participants also used these questions to structure simulation prebriefing and debriefing.

*Implementation of High Fidelity Human Patient Simulation*

Survey questions generated for determining how teacher participants implemented HFHPS experiences included:

> What steps or processes do you think about when you implement a simulation with students?
>
> What did you use to help learn or develop your process for implementing a simulation?

The themes found in the data were Ensuring Fidelity, Self-Development, and Developing Students' Thinking Skills. Ensuring Fidelity meant replicating a "real-

life patient situation" and making sure "all the props are in place". For teacher participants, it was important that "the environment project the real situation as much as possible so the students have as much buy in as possible".

For all teacher participants the process for implementing simulations came through Self-Development, which included reading the simulation literature, attending simulation conferences, talking with simulator salespeople and other simulation users, and observing simulation experiences. The most common responses from teacher participants about their processes for implementing simulations were "trial and error" and "learning by fire". One participant's statement was definitive, "It helped me to first view the experience, but finally jumping in and running the scenario on my own made me more confident and aware of how the students learn in this environment."

Developing Students' Thinking Skills was a high priority in teacher participants' implementation of HFHPS experiences. Teacher participants spoke of implementing simulations in a way that encouraged students to apply knowledge and respond to cues through critical thinking and use of the nursing process. "I want to draw on their past experiences in simulation and the classroom. I need them to realize through this process that they have the information. It's just a matter of applying it."

Another teacher put it this way:

> "Simulations are an immersive, and have an emotional, stress response for the student. This is not just learning about congestive heart failure; this is

about knowing how to think, prioritize, and respond safely when time is critical for the patient outcome."

*Research Question #2*

To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?

Data for this research question were collected using the teacher versions of the Educational Practices in Simulation Scale (EPSS-T) and the Simulation Design Scale (SDS-T) (Appendices J and K). These instruments were adapted by the investigator from the EPSS-S and SDS-S instruments used with students in the NLN/Laerdal study of simulation (Jeffries & Rizzolo, 2006).

*Instrument Validity and Reliability*

The item content validity indexes (I-CVI) for the EPSS-T and the SDS-T were calculated by dividing the number of experts who rated an item as either quite relevant or very relevant to the instruments' objectives by the total number of experts (Lynn; Waltz, et. al, 2005). Both experts rated all items on the EPSS-T as either quite relevant or very relevant, which resulted in an I-CVI of 1.0 for each item. Experts' ratings for all items on the SDS-T were also either quite relevant or very relevant also resulting in an I-CVI of 1.0 for each item.

The scale content validity index (S-CVI) for each instrument was calculated by dividing the number of items rated as either quite relevant or very relevant by the total number of items on the instrument (Lynn, 1986). Both instruments' S-CVIs were 1.0.

Cronbach's alphas for the importance and presence scales of the EPSS-T were .93 and .89 respectively. The SDS-T importance and presence scales both had Cronbach's alphas of .86. These findings are indicative of strong internal consistency reliability (Ferketich, 1990).

*Examination of Data*

As stated previously, the teacher participant sample size was reduced from 18 to 12 because six teachers who accessed the survey only completed the demographic information, which completely eliminated one site from the sample, and decreased the sample for sites A-C by one and for site D by two. Examination of the remaining teacher participants' data revealed no missing data.

The data from the EPSS-T and SDS-T Presence and Importance scales and their constituent components were examined for the presence of outliers using boxplots. No outliers were found in the data. The data did not represent a normal distribution based on the examination of boxplots and histograms as well as the kurtosis and skewness values for each of the scales and components described above. The Shapiro-Wilk test was run on total scores for each of the instruments' scales and components. The Shapiro-Wilk statistics were significant with a p-value of <.001 for the EPSS-T and the SDS-T Presence and Importance scales and their constituent components, indicating a lack of support for the hypothesis that the sample data had a normal distribution. The median is considered a better indicator of central tendency in skewed data (Waltz, et al, 2005) and is reported in Table 5 to facilitate comparison of teacher participants' data. Means are also reported in the table to

demonstrate nuances of difference between scale components that are lost when using only the medians. Means and medians will be used in describing the results.

Table 5

*Teacher Participant Measures of Central Tendency for EPSS-T and SDS-T*

| Scale/Component | Mean (SD) | Median |
|---|---|---|
| EPSS-T Presence Total | 4.28 (0.55) | 4.00 |
| Active Learning | 4.23 (0.22) | 4.00 |
| Collaboration | 4.56 (1.19) | 5.00 |
| Diverse Learning Styles | 4.17 (0.86) | 4.00 |
| High Expectations | 4.38 (0.49) | 4.50 |
| EPSS-T Importance Total | 4.50 (0.38) | 4.50 |
| Active Learning | 4.46 (0.39) | 4.50 |
| Collaboration | 4.67 (0.45) | 5.00 |
| Diverse Learning Styles | 4.71 (0.45) | 5.00 |
| High Expectations | 4.38 (0.49) | 4.00 |
| SDS-T Presence Total | 4.32 (0.51) | 4.50 |
| Objectives | 4.20 (0.52) | 4.50 |
| Support | 4.44 (0.37) | 4.50 |
| Problem solving | 4.43 (0.57) | 4.50 |
| Fidelity | 4.59 (0.52) | 5.00 |
| Feedback | 4.52 (0.40) | 5.00 |

Table 5 - Continued

*Teacher Participant Measures of Central Tendency for EPSS-T and SDS-T*

| Scale/Component | Mean (SD) | Median |
|---|---|---|
| SDS-T Importance Total | 4.62 (0.30) | 5.00 |
| Objectives | 4.53 (0.38) | 4.50 |
| Support | 4.50 (0.41) | 4.50 |
| Problem solving | 4.67 (0.38) | 5.00 |
| Fidelity | 4.84 (0.39) | 5.00 |
| Feedback | 4.67 (0.38) | 5.00 |

*Value and Use of Educational Practices and Simulation Design Characteristics*

The EPSS-T and SDS-T Presence scales used a five-point rating scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree) for the presence of educational best practices and design characteristics. The importance of the educational practices and design characteristics measured respectively by the EPSS-T Importance and SDS-T Importance scales were also rated with a five-point scale (5 = Very Important, 4 = Important, 3 = Neutral, 2 = Somewhat Important, 1 = Not Important). All means and medians for the EPSS-T and SDS-T instruments and their components were greater than four, meaning the teacher participant group perceived educational best practices and simulation design characteristics as represented in the Nursing Education Simulation Framework (NESF) (Jeffries 2005) were important and present in the HFHPS experiences provided to their students.

Overall, the means and medians for the EPSS-T and the SDS-T Presence scales and their components were slightly lower than the medians for the EPSS-T and SDS-T Importance scales and their components. The most valued components of the EPSS-T were Collaboration and Diverse Learning Styles. Feedback, Fidelity, and Problem solving were rated as the most important of the SDS-T components. Most present in the HFHPS experiences were the EPSS-T component of Collaboration and the SDS-T components of Feedback and Fidelity.

*Research Question #3*

To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high-fidelity human patient simulation experiences?

Quantitative data were collected using the Educational Practices in Simulation Scale – Student Version (EPSS-S), the Simulation Design Scale – Student Version (SDS-S), the Student Satisfaction with Learning Scale (LSS), and the Student Self-Confidence in Learning Scale (LSCS) (Appendix H). Internal consistency reliability for each scale was calculated using Cronbach's alpha and is provided in Table 6. The values were very similar to reliabilities for these instruments found in the NLN/Laerdal study (Jeffries & Rizzolo, 2006), which were considered strong (Ferketich, 1990).

Table 6

*Comparison of Internal Consistency Reliabilities (Cronbach's Alpha) to NLN/Laerdal Study*

| Instrument Scale | Current Study | NLN/Laerdal Study |
|---|---|---|
| SDS-T Presence Total | .94 | .92 |
| SDS-T Importance Total | .94 | .96 |
| EPSS-T Presence Total | .95 | .86 |
| EPSS-T Importance Total | .95 | .91 |
| LSS | .93 | .94 |
| LSCS | .87 | .87 |

*Examination of Data*

The data for the EPSS-S and SDS-S Presence and Importance scales and their components, and the LSS and LSCS were determined to be non-normally distributed based on the examination of boxplots and histograms as well as the kurtosis and skewness values for each scale and component. The Shapiro-Wilk test was run on total scores for each of the instruments' scales and components. The Shapiro-Wilk statistics were significant with a p-value of <.001 for all scales and components of the EPSS-S, the SDS-S, the LSS, and the LSCS, indicating a lack of support for the hypothesis that the sample data had a normal distribution. The median is considered a better indicator of central tendency in skewed data (Waltz, et al, 2005) and is reported in Table 7 along with the mean for the purpose of demonstrating the impact

of skewness on the mean. The means also demonstrate nuances of difference between scale components that are lost when only medians are reported.

The student participants' data were examined for the amount and pattern of missing data. The quantity of missing data was approximately 3-4% for all scales combined and occurred entirely at the item level. A small percentage such as this is not considered extensive and was handled by pairwise deletion. This method reduces sample size and can lead to bias and reduction of power (Wasylyshyn & El-Masri, 2005). However, due to the student participant sample size and the small amount of missing data, the study retained adequate power.

The data were examined for the presence of outliers using boxplots. There was a total of 21 participants whose responses were shown as outliers on the scales or constituent components of the SDS-S, EPSS-S, LSS, or LSCS. All outlier scores were below the mean for the measured variable to which they applied. The LSS had the most outliers with six, followed by the SDS-S Presence Support component with four. The LSCS, the EPSS-S Presence scale, the SDS-S Presence Fidelity component, and the SDS-S Presence Objectives component each had three outlier scores.

The percentages of outliers by Age Group was very similar to the sample Age Group percentages. Only one male participant (5%) was among the outliers, which is slightly less than the 7.9% males in the total sample. Over 50% of the outliers were in the third semester of their nursing programs, which is almost twice the percentage of this group in the sample (27.9%). It is also notable that 65% of the

outliers were from one site, which comprised 41.4% of the total sample. Further examination of the sample data showed that 47.6% (n = 10) of the outliers were in the third semester of the nursing program at the above mentioned site, which lead to the conclusion that an unknown extraneous variable may have contributed to the lower scores by these participants.

*Value and Use of Educational Practices and Simulation Design Characteristics*

Means and medians for all scales and their constituent components of the EPSS-S and SDS-S are presented in Table 7 to facilitate comparison of student participants' data for these variables. The EPSS-S and SDS-S Presence scales, and the LSS and LSCS used a five-point rating scale (5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2= Disagree, 1 = Strongly Disagree) for the presence of educational best practices and design characteristics. The importance of the educational practices and design characteristics measured respectively by the EPSS-S Importance and SDS-S Importance scales were also rated with a five-point scale (5 = Very Important, 4 = Important, 3 = Neutral, 2 = Somewhat Important, 1 = Not Important).

All means for the scales and components of the EPSS-S and SDS-S were at or above 3.82 with all medians at or above 4.0, meaning the student participant group perceived educational best practices and simulation design characteristics as represented in the Nursing Education Simulation Framework (NESF) (Jeffries, 2005) were important and were present in the HFHPS experiences. Overall, the means and medians for the SDS-S Presence scales and their components were lower than the means and medians for the SDS-S Importance scales and their components with the

exception of the SDS-S Presence Feedback component, which had a median equal to the highest median on the SDS-S Importance scales.

The SDS-S Importance scale had the highest scale mean and median of all instruments used with student participants. The medians were the same for all components of this scale except the Problem solving component, which was rated lower than the rest. The medians for the EPSS-S Presence and Importance scales and their components were the same, except for the EPSS-S Presence Collaboration component which had the highest mean and median for all scale components. Means and medians for the LSS and LSCS were indicative of general satisfaction and self-confidence after HFHPS experiences

Table 7

*Student Participant Measures of Central Tendency for EPSS-S, SDS-S, LSS, and LSCS*

| Scale/Component | Mean (S.D.) | Median |
|---|---|---|
| EPSS-S Presence Total | 3.98 (0.64) | 4.00 |
| Active Learning | 3.96 (0.81) | 4.00 |
| Collaboration | 4.49 (0.74) | 5.00 |
| Diverse Learning Styles | 3.87 (1.08) | 4.00 |
| High Expectations | 3.82 (1.04) | 4.00 |
| EPSS-S Importance Total | 4.27 (0.52) | 4.00 |
| Active Learning | 4.28 (0.52) | 4.00 |

Table 7 - Continued

*Student Participant Measures of Central Tendency for EPSS-S, SDS-S, LSS, and LSCS*

| Scale/Component | Mean | Median |
|---|---|---|
| Collaboration | 4.28 (0.70) | 4.00 |
| Diverse Learning Styles | 4.23 (0.68) | 4.00 |
| High Expectations | 4.34 (0.68) | 4.00 |
| SDS-S Presence Total | 4.08 (0.63) | 4.00 |
| Objectives | 4.10 (0.69) | 4.00 |
| Support | 4.06 (0.84) | 4.00 |
| Problem solving | 3.96 (0.73) | 4.00 |
| Fidelity | 3.99 (1.02) | 4.00 |
| Feedback | 4.39 (0.72) | 4.50 |
| SDS-S Importance Total | 4.34 (0.49) | 4.50 |
| Objectives | 4.39 (0.54) | 4.50 |
| Support | 4.44 (0.57) | 4.50 |
| Problem solving | 4.20 (0.58) | 4.00 |
| Fidelity | 4.37 (0.65) | 4.50 |
| Feedback | 4.42 (0.59) | 4.50 |
| LSS | 3.78 (0.85) | 4.00 |
| LSCS | 3.87 (0.63) | 4.00 |

*Research Question #4*

What are associate degree nursing students' perceptions of the experience of high-fidelity human patient simulation?

Student participants (N = 137) answered four open-ended survey questions (Appendix I) that provided the qualitative data that were analyzed for themes. The number of responses to each survey question and the detailed answers provided by many of the participants resulted in saturation in the data and the opportunity for rich, thick description, both goals of the study's qualitative research component (Lincoln & Guba, 1985; Munhall, 2007). Table 8 summarizes the themes found in the data.

Table 8

*Themes for Student Participant Perceptions of HFHPS*

| Theme Categories | Themes | | |
|---|---|---|---|
| Preparation for HFHPS Themes | Gathering Information | Analyzing Information | Demonstrating Understanding |
| Information needed from Faculty Themes | Patient Information | Expectations | Orientation to the Simulation Experience |
| Positive HFHPS Characteristics Themes | Learning from Mistakes | Preparation for Real Life | Safe Environment |
| Negative HFHPS Characteristics Themes | Surveillance | Fidelity Limitations | Teaching/Learning Practices |

*Preparation for High Fidelity Human Patient Simulation*

The first survey question asked how students were expected to prepare for the simulation experience. Student participants stated they were expected "to prepare as we do for normal clinical days", to perform "prep similar to what we would do for any patient we had in a clinical setting", and to prepare "as if it were a real patient". Three themes emerged from student participants' responses to this survey question – Gathering Information, Analyzing Information, and Demonstrating Understanding.

The Gathering Information theme included student participants' descriptions of reviewing the patient's history to ascertain the chief complaint, past medical problems, pertinent laboratory test results, and currently ordered medications.

In the Analyzing Information theme student participants researched the medical diseases or problems and determined their impact on the patient's care. Laboratory results were evaluated as indicators of the patient's current condition, and medications were considered for expected therapeutic and potential adverse effects.

Demonstrating Understanding, the third theme, included answering pre-simulation questions about the patient's condition, and writing out the rationales for the medications and laboratory tests ordered. Students were also expected to describe the nursing care that was planned.

*Information Needed from Faculty*

The second survey question asked what information students needed from faculty prior to the simulation experience. The themes of Patient Information, Expectations, and Orientation to the Simulation Experience were found in the data.

Two subthemes were identified within the theme of Orientation to the Simulation Experience – Fidelity and Logistics.

The theme, Patient Information, was characterized by one student whose response was “all important things”. Most student participants wanted to know as much as possible about the simulated patient ahead of time, including medications, laboratory and diagnostic test results, physical assessment findings, and history of the disease process. In contrast, a few students believed receiving a minimum amount of information prior to the simulation experience was optimum.

> “Really no information is needed. The simulations are based on current units of teaching. It is nice to know the possible scenarios that may be given, but it is not needed because in the real situation, you have no advanced warning of the patient you are going to take care of.”
>
> “I feel like the prep gives us too much information about the disease process occurring with our patient. We’re not able to come to the conclusion of the issue ourselves; the prep tips us off to what’s going to happen.”

The Expectations theme included skills the student should be prepared to perform and knowledge the student should possess before beginning the simulation experience. As one student stated “Just knowing what to expect decreased a lot of the anxiety associated with a new situation”.

Within the theme of Orientation to the Simulation Experience, one subtheme was Logistics. Student participants wanted to know where to locate supplies and

equipment, what resources were available to them, and how to access those resources.

> "On our very first simulation, we had never been oriented to the lab and what supplies/equipment were available to us. In my first simulation, I needed to put oxygen on my patient, but didn't even know if we had nasal cannulas in the room. I had to dig around to find everything I needed, which took a lot of time. Proper orientation to the facility would have been appreciated prior to the start of the simulation."

Fidelity was a second sub-theme of Orientation, and related specifically to information about the manikins. Students wanted to know the limitations of the manikins in displaying physical symptoms, which procedures could or could not be performed on the manikins, as well as the expected mechanical sounds of the manikins versus simulated physiologic responses, such as blood pressure.

*Positive High Fidelity Human Patient Simulation Characteristics*

The third survey question simply asked what students liked best about the simulation experience. Three themes were found in the data - Learning from Mistakes, Preparation for Real Life, and Safe Environment. The Learning from Mistakes theme was the most common. Self-reflection and feedback from faculty during debriefing contributed to the learning from mistakes.

> "Awesome learning experience. You learn so much and you are allowed to make mistakes because they are not real people. Even though they act like it.

You learn from those mistakes you make in simulation so you do not actually make those mistakes on real patients."

"I like the pre and post conference the best. It really gives me a chance to think through what I will do and what I did during the simulation. I can also hear what I did well and what I need to do differently next time."

The Preparation for Real Life theme encompassed the fidelity of the experience, exposure to experiences prior to working with real patients or not available in traditional clinical settings, opportunities to critically think through a situation, and opportunities to work independently of faculty or to work as a team with other students. Students commented that "after a while it feels real", "you forget that it's not a real person".

"I liked being able to see what it is really like juggling a patient's care. We don't really get to do that in clinical because the nurse is ultimately responsible for the patients, and we aren't in charge of the patient's care. In the simulation lab, we do everything, which makes me feel like I've accomplished something and am capable at the end of the day."

The Safe Environment theme spoke to two areas of students' anxiety related to caring for patients. The most common area was represented by the idea of being able to practice nursing without the risk of harming patients. A frequent comment from student participants about their simulation experiences was the ability to have a "clinical experience without worry of hurting someone if a mistake is made." A second less common aspect of the Safe Environment theme was characterized by

student responses such as “I can’t fail” and “the understanding that it is a learning environment and mistakes would not be held against me”.

*Negative High Fidelity Human Patient Simulation Characteristics*

Student participants were also asked what they liked least about the simulation experience. The three themes found in the data were Surveillance, Fidelity Limitations, and Teaching/Learning Practices. Within the Teaching/Learning Practices theme were four subthemes - Feeling Lost, Group Size, Time for Learning, and Negative Behaviors.

Surveillance emerged as a common theme in the data as students described their dislike of being watched by faculty and simulation laboratory technicians. Another aspect of the Surveillance theme was a dislike of being videotaped during the simulation experience. The idea of being watched appeared to increase student anxiety.

> “I feel there is added pressure to do everything perfectly, because I know that there are people watching me from behind the two-sided mirror, and I always wonder if they are back there laughing at me.”

One aspect of the Fidelity Limitations theme focused on the limitations of the simulator manikins, and was captured in the following response.

> “It’s hard to play act that a patient is real when the patient is plastic and has limitations that a real patient wouldn’t have – cold plastic feet, skin that can’t be pierced with an IV, fluids that can’t be infused, adventitious breath sounds

> that may or may not be a mechanical sound from the motor, etc. I get tired of asking what we can or can't do with the simulator dummies."

A second aspect of the Fidelity Limitations theme was the student's ability to suspend disbelief. Many students reported feeling uncomfortable with role play and "talking" to the patient, while others found it difficult to be serious during the simulation experience.

Teaching/Learning Practices related to the simulation experience emerged as another theme. Student participants disliked Feeling Lost, the first subtheme. A lack of orientation to the simulation laboratory and manikins as well as uncertainty of the expectations for the simulation experience and for their actions contributed to students Feeling Lost. Feeling Lost also occurred when the simulation scenario was perceived as being too complex for the student's current level of knowledge. However, as expressed by one student there could be value derived from these situations. "I guess I felt nervous because I didn't know what to expect each time. Sometimes I felt really clueless, but I'll never forget what I learned in those uncomfortable times."

Group Size during the simulation experience was another subtheme. Many students commented that more than three students in a group were too many. As one student participant stated,

> "I've found that these sim opportunities work best when you are able to limit the number of students participating to no more than three – after that, being

students, we become too disorganized to gain maximum benefit from the experience."

Students also wanted to be actively involved with the care of the patient. Too many students involved in the simulation experience equated to a lack of opportunity for critical hands-on practice. More than three students participating in the simulation were also perceived as unrealistic and caused the nursing role to become fragmented.

The subtheme, Time for Learning, was further broken into the length of time for one simulation experience and the total time spent in simulation experiences over the semester. Most students desired a greater amount of time for both, although a small minority of student participants responded that simulation experiences were "a waste of time" or took away from clinical time with real patients. The faculty-assigned pre-simulation preparation assignments were also a factor. Student responses about the preparation ranged from "it is too time consuming" to wanting to spend more time discussing the preparation assignments with the instructor prior to the simulation experience. Students wanted more time in individual simulation experiences because they were "too rushed" and were not able to implement the planned interventions.

The desire for more total time in simulation experiences related to the quality of the learning taking place. As one student stated, "We had anywhere from 2-3 simulations per semester. This is definitely adequate, but because I learned so much from these, I would have liked more simulation experiences per semester."

The Negative Behaviors subtheme emerged from student reported negative responses from faculty during the debriefing, with statements such as “during postconference an instructor was belittling the group” and “I didn’t feel as if it was a learning environment. I felt as if it was a humiliation session.” Student participants stated that a lack of knowledge by the faculty of how to run the simulator detracted from the value of the learning experience.

*Comparison of Qualitative and Quantitative Results*

The themes and supporting data described above from analysis of the four open-ended survey questions were compared to the components of the scales of the SDS-S and the EPSS-S. Table 9 indicates how the themes and the components from the EPSS-S and SDS-S compare.

Means and medians from the EPSS-S and the SDS-S indicated student participants valued the Nursing Education Simulation Framework (NESF) elements measured by these instruments. Table 9 illustrates the themes that emerged from the Student Open-ended Questionnaire (Appendix I) to the educational best practices and simulation design elements that comprised the NESF model.

Scores on the LSS and the LSCS indicated students were generally satisfied and confident of their learning from HFHPS experiences. The data for the themes of Learning from Mistakes, Preparation for Real Life, and Safe Environment as described above supported this finding.

Table 9

*Comparison of Themes to SDS-S and EPSS-S Components*

| Open-ended Survey Question & Themes | Related SDS-S Element | Related EPSS-S Element |
|---|---|---|
| How were you expected to prepare for the simulation? | | |
| Gathering Information | Problem-solving | Active Learning |
| Analyzing Information | | High Expectations |
| Demonstrating Understanding | | |
| What information is important for your nursing faculty to provide before you begin a simulation experience? | | |
| Patient Information | | |
| Expectations | Support | High Expectations |
| Orientation to the Simulation | Objectives | |
| Experience | Fidelity | |
| What did you like best about the simulation? | | |
| Learning from Mistakes | | |
| Preparation for Real Life | Feedback/Reflection | Collaboration |
| Safe Environment | Problem-solving | Active Learning |
| | | Diverse Ways of Learning |

Table 9 – Continued

*Comparison of Themes to SDS-S and EPSS-S Components*

| Open-ended Survey Question & Themes | Related SDS-S Element | Related EPSS-S Element |
|---|---|---|
| What did you like least about the simulation? | | |
| Surveillance | Support | High Expectations |
| Fidelity Limitations | Objectives | Active Learning |
| Teaching/Learning Practices | Fidelity | |
| Feeling Lost | Feedback | |
| Group Size | | |
| Time for Learning | | |
| Negative Behaviors | | |

*Research Question #5*

What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perception of the presence and importance of educational best practices and simulation design characteristics?

Spearmen's rho correlations were calculated to determine whether relationships between the above variables existed and the nature of those relationships (Table 10). All calculated correlation values were positive and

significant at the p = .01 level. Correlations of the EPSS-S Importance and SDS-S Importance scales to the LSS and LSCS scales were at the lower end of the .40 to .70 range Williams and Monge (2001) described as moderate, with the exception of the correlation of the SDS-S Importance scale to the LSCS scale (rho = .39). The presence of NESF educational best practices and simulation design characteristics measured by the EPSS-S and the SDS-S Presence scales had a much stronger relationship to Satisfaction and Self-confidence with correlations ranging from .66 to .76.

Table 10

*Correlations of EPSS-S and SDS-S Scales with LSS and LSCS*

| Scale N=127 | EPSS-S Importance | EPSS-S Presence | SDS-S Importance | SDS-S Presence | LSS | LSCS |
|---|---|---|---|---|---|---|
| LSS | .41 | .76 | .40 | .66 | --- | .77 |
| LSCS | .42 | .69 | .39 | .71 | .77 | --- |

*Research Question #6*

Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high-fidelity human patient simulation?

The themes and patterns found in the content analysis of the open-ended survey questions answered by student and teacher participants were compared to answer the research question (Table 11). Student participants were asked what they liked most and least about the HFHPS experience. Teacher participants answered

questions asking for the reasons they use simulation, as well as the advantages and drawbacks to using simulation. The similarities in these questions laid the foundation for initial comparisons.

Table 11

*Student and Teacher Participants' Themes*

| Student Themes | Teacher Themes |
|---|---|
| Positive HFHPS Characteristics | |
| Learning from Mistakes | Student Evaluation |
| Preparation for Real Life | Preparation for Real Life |
| Safe Environment | Safe Environment |
| Negative HFHPS Characteristics | |
| Fidelity Limitations | Simulation Acceptance |
| Surveillance | Time Expenditure |
| Teaching/Learning Practices | |

The themes found in the teacher participants' data regarding why they used simulation and the advantages to using simulation were Student Evaluation, Preparation for Real Life, and Safe Environment. Student participants' themes for what they liked best were Learning from Mistakes, Preparation for Real Life, and Safe Environment. There were many parallels in the student and teacher participants' data from which these themes were derived.

The Student Evaluation theme clearly showed teacher participants liked being able to “actively evaluate how the student reacts to differing scenarios”. Teachers were able to evaluate skills and “really see how the students are processing information and their ability to use critical thinking”. One teacher commented, “I can actually be present for what they are doing with the patient and am not always able to be with them in the clinical setting”. Teacher participants also described how simulation allowed students to reflect and evaluate their performance during the simulation. Another aspect of the Student Evaluation theme was the ability to facilitate learning by “helping clarify and prioritize the essential content”. “An acute care clinical environment is often chaotic and you can not always ‘pause’ and help the students process what is happening.”

The student participant theme of Learning from Mistakes coincided with the teacher theme of Student Evaluation as feedback from faculty and self-reflection during debriefing was commonly cited by student participants as contributing to learning from mistakes. One student participant commented,

> “The learning by interaction and the learning after the simulation was complete with the clinical instructor. It gave a real evaluation of what I actually could critically think through in an actual setting and what I did not know and learned during the debriefing.”

The data from both teacher and student participants yielded the themes labeled Preparation for Real Life. Representative of teacher participants was the statement that simulation provided opportunities for students to “feel the

responsibility of being the RN". Student participants had similar comments, "It feels like you are really working as an RN when you are paging the doctor to call and report or get orders."

Student participants liked being able to make decisions on their own and some even felt the stress they experienced in those situations was beneficial.

"The stress of the situation. It made things real. If my patient was going down, then it was a real feeling that I think that we would have in a real situation. I also liked that we were forced to critically think on our feet; the situation could change from minute to minute."

Teacher participants responded similarly,

"Simulations are an immersive, and have an emotional, stress response for the student. This is not just learning about congestive heart failure; this is learning how to think, prioritize, and respond safely when time is critical for the patient outcome."

Also part of this theme described by teacher and student participants was the opportunity for students to engage in complex practice experiences that would not otherwise be available in the clinical setting. One student participant's comment summarized this pattern.

"Cardiac emergency! I feel that this was the most beneficial experience for me because it was the most life threatening and the scariest to be unprepared for in the real world. Simulation gives us the opportunity to have a variety of situations we may not have encountered in school."

Safe Environment was an important theme for both groups of participants. Teacher participants described the simulation environment as “nonthreatening” for students while student participants cited “the understanding that it is a learning environment and mistakes would not be held against me”. Patient safety was a high priority for both groups. Student participants’ characterization of simulation as “the best way to learn without actually harming anyone’s life” was much like the teacher participants’ perspective of being able to “put students outside their comfort zone and push them a little without concern of harm to anyone”.

The themes for teacher participants’ drawbacks to using simulation and student participants’ dislikes in the simulation experience were compared. Teacher participant themes were Simulation Acceptance and Time Expenditure. Surveillance, Fidelity Limitations, and Teaching/Learning Practices were student participant themes.

The student theme of Fidelity Limitations had similarities to the teacher theme of Simulation Acceptance. While teacher participants mentioned the need for all faculty to embrace simulation as a learning tool, their most frequent comment related to students’ acceptance of simulation as demonstrated in this statement, “There’s always that ‘this isn’t real’ feel block that students who are resistant to this teaching method use”.

Student participants disliked “fake patients” with whom they had to “pretend to have a conversation”. The inability of the simulator manikin to “change skin

colors, become diaphoretic, or change facial expressions" was also a problem. In contrast to these statements, one student participant commented,

> "I think in the beginning students often feel they won't get anything from the experience, but the further we go along the more we recognize we really will and we start to take advantage of the opportunity in front of us and really do treat it as a realistic situation."

The other student themes of Surveillance and Teaching/Learning Practices as described in research question #3 did not parallel the teacher theme of Time Expenditure with the exception that both groups described the pre-simulation student preparation as taking too much time. For teacher participants, the theme of Time Expenditure was exemplified by the following statements.

> "…the fact that it is very time consuming and unless all the faculty are taking part in its creation they assume that simulation faculty just do not work as hard as they do in clinical and in the classroom. Which is so far from the truth."

> "Simulation is MUCH more time consuming for the faculty facilitator in planning, implementing, and evaluating – I do not think this is recognized as equitably as it could be in faculty load. I think this needs to be carefully looked at as burn out could be a real concern among faculty."

*Research Question #7*

What is the relationship between associate degree nursing faculty and nursing students' perceptions of the presence and importance of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?

Means and medians for student and teacher participants' responses on the EPSS and SDS instruments were categorized as the first step in answering this research question. The High category was defined as a mean and median value above the middle ranking score of three on the instruments' five-point rating scale. The EPSS and SDS Importance scales for both teachers and students described three as Neutral. On the EPSS and SDS Presence scales three was described as Undecided. The Low category was defined as a mean and median value below the middle ranking of three on the instruments' five point rating scale.

*Comparison of Student and Teacher Participant Data*

Categorization of the mean and median values for student and teacher participants' data on the EPSS and SDS Presence and Importance scales and constituent components showed all means and medians were in the High category. This suggests that both student and teacher participant groups perceived educational best practices and simulation design characteristics as represented in the Nursing Education Simulation Framework (NESF) (Jeffries, 2005) were present and were important in the HFHPS experiences. Overall, teacher participants' means and

medians for the EPSS and SDS Presence and Importance scales and components were higher than for student participants.

Side by side comparison of the mean and median values for student and teacher participants on the EPSS and SDS Presence and Importance scales and their components shown in Table 12 revealed several similarities and differences between student and teacher participants' data. Overall, both groups had higher mean and median values on the total scores for the Importance scales of the SDS than on the total scores for the Presence scales of this instrument indicating a greater perception of the importance of simulation design characteristics than of their presence in the HFHPS experience. Teacher participants' total score mean and median on the EPSS-T Importance scale were higher than total score mean and median on the EPSS-T Presence scale. In contrast, medians for total scores on the EPSS-S Importance and Presence scales were equal for student participants, although the EPSS-S Importance mean for total scores was slightly higher than the Presence mean.

*Comparison of EPSS and SDS Importance scales data for student and teacher participants.* When the median was used, all components of the EPSS Importance scales were rated equally by student participants while the components of Diverse Learning Styles and Collaboration were rated highest by teacher participants. Among the highest ratings on the SDS Importance scales for teacher and student participants were the components of Feedback and Fidelity. Conversely, the SDS Importance component of Problem solving was rated as highly as Feedback and Fidelity by teacher participants, but was rated lowest on the SDS Importance

scale by student participants. Additionally, teacher participants rated the components of Support and Objectives lowest on the SDS Importance scale while they were among the most highly rated components by student participants.

*Comparison of EPSS and SDS Presence scales data for student and teacher participants.* The EPSS Presence Collaboration component had the highest mean and median on that scale for both groups, indicating student and teacher participants perceived a greater presence of collaboration within the HFHPS experience than other scale components. Additionally, the highest mean and median for student participants on the SDS Presence scale was for the component of Feedback, which ranked highest for teacher participants along with the component of Fidelity. Both groups appeared to perceive feedback as one of the most highly present SDS components in the HPHPS experience.

A difference between the two groups was noted as teacher participants' perceived a higher presence of the component of Fidelity while student participants' perceptions of this component were equal to all other components on that scale, except for Feedback.

*Comparison of student and teacher participant findings for components of the EPSS and SDS Presence and Importance scales.* The value placed on particular EPSS and SDS components appeared to influence the perception of their presence in the HFHPS experience. The EPSS component of Collaboration, highly important to both groups, was perceived as the EPSS component most present in the HFHPS experience by student and teacher participants. Both groups placed high value on the

SDS component of Feedback and perceived it as the SDS component most present in the HFHPS experience. Fidelity was valued highly by both groups, but perceptions differed as teacher participants rated it as highly present in the HFHPS experience and student participants perceived it as no more highly present than other simulation design characteristics. Teacher participants rated High Expectations lowest in importance among the EPSS components and student participants perceived it as least present in the HFHPS experiences.

Table 12

*Comparison of Teacher and Student Means for EPSS and SDS Scales and Components*

| Instrument Scales & Components | Mean/Median Teachers N = 12 | Mean/Median Students N = 123* |
|---|---|---|
| EPSS Presence Total | 4.28/4.00 | 3.98/4.00 |
| Active Learning | 4.23/4.00 | 3.96/4.00 |
| Collaboration | 4.56/5.00 | 4.49/5.00 |
| Diverse Learning Styles | 4.17/4.00 | 3.87/4.00 |
| High Expectations | 4.38/4.50 | 3.82/4.00 |
| EPSS Importance Total | 4.50/4.50 | 4.27/4.00 |
| Active Learning | 4.46/4.50 | 4.28/4.00 |
| Collaboration | 4.67/5.00 | 4.28/4.00 |
| Diverse Learning Styles | 4.71/5.00 | 4.23/4.00 |

Table 12 – Continued

*Comparison of Teacher and Student Means for EPSS and SDS Scales and Components*

| Instrument Scales & Components | Mean/Median Teachers N = 12 | Mean/Median Students N = 123* |
|---|---|---|
| EPSS Importance | | |
| High Expectations | 4.34/4.00 | 4.34/4.00 |
| SDS Presence Total | 4.32/4.50 | 4.08/4.00 |
| Objectives | 4.20/4.50 | 4.10/4.00 |
| Support | 4.44/4.50 | 4.06/4.00 |
| Problem solving | 4.43/4.50 | 3.96/4.00 |
| Fidelity | 4.59/5.00 | 3.99/4.00 |
| Feedback | 4.52/5.00 | 4.39/4.50 |
| SDS Importance Total | 4.62/5.00 | 4.34/4.50 |
| Objectives | 4.53/4.50 | 4.39/4.50 |
| Support | 4.50/4.50 | 4.44/4.50 |
| Problem solving | 4.67/5.00 | 4.20/4.00 |
| Fidelity | 4.84/5.00 | 4.37/4.50 |
| Feedback | 4.67/5.00 | 4.42/4.50 |

**Student sample size affected by missing item level data.*

*Comparison of Student and Teacher Participants' Data by Study Site*

The data were analyzed by site and comparisons were made between the mean and median values for student and teacher participants on the EPSS and SDS

Presence and Importance scales. Highest and lowest means and medians for the EPSS and SDS components for teacher and student participants were also compared.

*Site A.* A side by side comparison of the site A teacher and student participants' means and medians for the EPSS and SDS Presence and Importance scales and their highest and lowest component means and medians is presented in Table 13. In general, teacher participants' means and medians were higher than those of student participants. The Importance scales of the EPSS and SDS had higher means and medians for student and teacher participants than the Presence scales of these instruments.

Both groups agreed that Feedback was the most important and most present SDS component in the HFHPS experience. The EPSS component of Collaboration, most highly valued by teacher participants along with Diverse Ways of Learning, was perceived as the component most present in HFHPS by students and teacher participants. Teacher participants rated the High Expectations component of the EPSS as least important. For student participants it was perceived as most important and least present in the HFHPS experience.

Table 13

*Comparison of Site A Teacher and Student Means and Medians*

| Instrument scales | Teachers | | Students | |
|---|---|---|---|---|
| and components | Mean (S.D.) | Median | Mean (S.D.) | Median |
| | n = 3 | | n = 10 | |
| EPSS Presence Total | 4.41 (0.29) | 4.50 | 3.92 (0.56) | 4.00 |

Table 13 – Continued

*Comparison of Site A Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 3 | | n = 10 | |
| EPSS Importance Total | 4.86 (0.15) | 5.00 | 4.29 (0.31) | 4.50 |
| SDS Presence Total | 4.47 (0.14) | 4.50 | 4.11 (0.31) | 4.00 |
| SDS Importance Total | 4.82 (0.24) | 5.00 | 4.39 (0.65) | 4.50 |
| Highest EPSS Presence component | Collaboration 5.0 (0.0) | 5.00 | Collaboration 4.60 (0.55) | 5.00 |
| Highest EPSS Importance component | Collaboration, Diverse ways of learning 5.0 (0.0) | 5.00 | High expectations 4.50 (0.47) | 4.50 |
| Highest SDS Presence component | Feedback 4.92 (0.14) | 5.00 | Feedback 4.35 (0.59) | 4.50 |
| Highest SDS Importance component | Feedback 4.92 (0.14) | 5.00 | Feedback 4.52 (0.56) | 4.50 |
| Lowest EPSS Presence component | Diverse ways of learning 4.16 (1.04) | 4.00 | High expectations 3.60 (0.76) | 4.00 |

Table 13 – Continued

*Comparison of Site A Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 3 | | n = 10 | |
| Lowest EPSS Importance component | High expectations 4.67 (0.55) | 5.00 | Active learning 4.23 (0.45) | 4.00 |
| Lowest SDS Presence component | Objectives 4.20 (0.35) | 4.00 | Problem solving 3.84 (0.76) | 4.00 |
| Lowest SDS Importance component | Objectives, Fidelity 4.67 (0.42, 0.55) | 5.00 | Objectives, Problem solving 4.34 (0.69, 0.58) | 4.00 |

*Site B.* Table 14 compares teacher and student participant means and medians for site B. Teacher participants' means and medians for the EPSS and SDS Presence and Importance scales and components were generally higher than those for student participants. Collaboration was valued by teacher participants, and for both groups it was among the highest rated components on the EPSS Presence scales. Diverse Ways of Learning was among the most valued components for the EPSS scales for teacher and student participants, but student participants perceived it as the least present EPSS component in the HFHPS experience. The SDS Fidelity component, which was given the most importance by teacher participants, was perceived as the most present in the HFHPS experience by student participants.

Problem solving, also an SDS component, was perceived as most present in HFHPS experiences by teacher participants, but as least present by student participants.

Table 14

*Comparison of Site B Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 2 | | n = 10* | |
| EPSS Presence Total | 4.70 (0.23) | 4.50 | 3.91 (1.06) | 4.00 |
| EPSS Importance Total | 4.29 (0.42) | 4.00 | 4.35 (0.52) | 4.50 |
| SDS Presence Total | 4.55 (1.27) | 4.50 | 3.98 (0.80) | 4.00 |
| SDS Importance Total | 4.70 (0.42) | 5.00 | 3.96 (1.09) | 4.00 |
| Highest EPSS Presence component | Collaboration, Diverse Ways of Learning, High Expectations | | Collaboration | |
| | 5.00 (0.0) | 5.00 | 4.17 (1.36) | 5.00 |
| Highest EPSS Importance component | Collaboration, Diverse Ways of Learning | | High Expectations, Diverse Ways of Learning | |
| | 4.50 (0.71, 0.71) | 4.50 | 4.44 (0.56, 0.47) | 4.50 |
| Highest SDS Presence component | Problem-solving | | Fidelity | |
| | 5.00 (0.0) | 5.00 | 4.25 (0.63) | 4.50 |

Table 14 – Continued

*Comparison of Site B Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 2 | | n = 10* | |
| Highest SDS | Fidelity | | Objectives | |
| Importance component | 5.00 (0.0) | 5.00 | 4.58 (0.42) | 5.00 |
| Lowest EPSS | Active Learning | | Diverse Ways of Learning | |
| Presence component | 4.77 (0.32) | 4.50 | 3.78 (1.28) | 4.00 |
| Lowest EPSS | Active Learning | | Collaboration | |
| Importance component | 4.27 (0.39) | 4.00 | 4.06 (1.33) | 4.00 |
| Lowest SDS | Objectives, Support, Fidelity | | Problem-solving | |
| Presence component | 4.50 (0.71, 0.36, 0.71) | 4.50 | 3.85 (0.80) | 4.00 |
| Lowest SDS | Support, Feedback | | Fidelity | |
| Importance component | 4.50 (0.71, 0.71) | 4.50 | 4.28 (0.83) | 4.00 |

* *Student sample size affected by missing item level data*

*Site C.* As shown in Table 15, site C student participants' total scores on the EPSS and SDS instruments produced generally lower means and medians than for teacher participants. Both groups rated Feedback as the most highly present SDS component. For teacher and student participants the highest EPSS Importance component was Collaboration, although Diverse Ways of Learning had the same importance for teacher participants. The importance placed on Collaboration

appeared to affect its perceived presence in the simulation, as it was rated as the most highly present EPSS component by student participants.

Several contrasts were found in the data for student and teacher participants. High Expectations was perceived as the least important and the most present EPSS component for teacher participants, while for student participants it was the least present EPSS component. Student participants highly valued the SDS component of Support, however, teacher participants perceived it as the least important component in the HFHPS experience.

Table 15

*Comparison of Site C Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 2 | | n = 54* | |
| EPSS Presence Total | 3.65 (0.99) | 3.50 | 3.81 (0.84) | 4.00 |
| EPSS Importance Total | 4.50 (0.12) | 4.50 | 4.26 (0.55) | 4.00 |
| SDS Presence Total | 4.71 (0.28) | 4.50 | 3.90 (0.69) | 4.00 |
| SDS Importance Total | 4.60 (0.07) | 4.50 | 4.28 (0.57) | 4.50 |
| Highest EPSS Presence component | High Expectations 4.00 (0.0) | 4.00 | Collaboration 4.37 (0.75) | 4.50 |
| Highest EPSS Importance component | Collaboration, Diverse Ways of Learning 5.00 (0.0) | 5.00 | Collaboration 4.34 (0.70) | 4.50 |

Table 15 – Continued

*Comparison of Site C Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) n = 2 | Teachers Median | Students Mean (S.D.) n = 54* | Students Median |
|---|---|---|---|---|
| Highest SDS Presence component | Feedback 4.75 (0.53) | 4.50 | Feedback 4.25 (0.70) | 4.00 |
| Highest SDS Importance component | Fidelity 5.00 (0.0) | 5.00 | Support 4.41 (0.58) | 4.50 |
| Lowest EPSS Presence component | Collaboration 3.00 (2.82) | 3.00 | High Expectations 3.61 (1.05) | 4.00 |
| Lowest EPSS Importance component | High Expectations 4.00 (0.0) | 4.00 | Diverse Ways of Learning 4.27 (0.67) | 4.00 |
| Lowest SDS Presence component | Objectives 3.70 (0.42) | 4.00 | Fidelity 3.59 (1.17) | 4.00 |
| Lowest SDS Importance component | Support 4.25 (0.12) | 4.00 | Problem-solving 4.19 (0.55) | 4.00 |

* *Student sample size affected by missing item level data*

*Site D.* The comparisons of site D student and teacher participants are illustrated in Table 16. Overall, teacher participant means and medians on the EPSS and SDS Presence and Importance scales and components were higher than for student participants. Teacher and student participants valued Collaboration and

perceived it to be the most highly present EPSS component in the HFHPS experience.

For both groups the most important SDS component was also perceived as the most highly present. However, the chosen component was different for teacher and student participants. Teacher participants valued the Fidelity component the most while student participants perceived the Feedback component as most important. In contrast, teacher participants rated Feedback as least present in the HFHPS experience.

Table 16

*Comparison of Site D Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 5 | | n = 56* | |
| EPSS Presence Total | 4.18 (0.40) | 5.00 | 4.11 (0.78) | 4.00 |
| EPSS Importance Total | 4.63 (0.47) | 5.00 | 4.23 (0.56) | 4.00 |
| SDS Presence Total | 4.47 (0.14) | 5.00 | 4.11 (0.73) | 4.00 |
| SDS Importance Total | 4.82 (0.24) | 5.00 | 4.18 (0.77) | 4.00 |
| Highest EPSS Presence component | Collaboration 4.70 (0.45) | 5.00 | Collaboration 4.63 (0.56) | 5.00 |
| Highest EPSS Importance component | Diverse Ways of Learning 4.50 (0.50) | 4.50 | High Expectations 4.35 (0.69) | 4.00 |

Table 16 – Continued

*Comparison of Site D Teacher and Student Means and Medians*

| Instrument scales and components | Teachers Mean (S.D.) | Teachers Median | Students Mean (S.D.) | Students Median |
|---|---|---|---|---|
| | n = 5 | | n = 56* | |
| Highest SDS Presence component | Fidelity 4.80 (0.45) | 5.00 | Feedback 4.55 (0.65) | 5.00 |
| Highest SDS Importance component | Fidelity 4.80 (0.45) | 5.00 | Feedback 4.50 (0.58) | 4.50 |
| Lowest EPSS Presence component | Diverse Ways of Learning 4.10 (0.65) | 4.00 | High Expectations 4.03 (0.97) | 4.00 |
| Lowest EPSS Importance component | Active Learning 4.31 (0.45) | 4.50 | Diverse Ways of Learning 4.14 (0.74) | 4.00 |
| Lowest SDS Presence component | Feedback 4.25 (0.31) | 4.00 | Problem-solving 3.97 (0.72) | 4.00 |
| Lowest SDS Importance component | Support 4.40 (0.42) | 4.50 | Problem-solving 4.17 (0.61) | 4.00 |

* *Student sample size affected by missing item level data*

*Comparison of study sites.* Comparisons were made between the results for each of the study sites. The individual study sites results for lowest and highest rated EPSS and SDS components were also compared to the findings from the full samples of students and teachers (Tables 17 and 18). The means and medians for the EPSS and SDS Presence and Importance scales and constituent components all fell into the

High category at each site just as they did for the full study samples. Student and teacher participants at each site perceived educational best practices and simulation design characteristics as represented in the NESF (Jeffries, 2005) were present and important in the HFHPS experience. In addition, the means and medians for teacher participants at each site were generally higher than for student participants, which were also seen in the results for the full samples.

Diverse Learning, perceived as one of the most important and present EPSS components for the full sample of teacher participants was highly important to teacher participants at each of the sites. Collaboration, also one of the most important EPSS components for the full sample of teachers, was equally important to teacher participants at all sites, except site D. Student participants at all sites found Collaboration to be highly present in the HFHPS experience as did teacher participants at all sites, except site C.

In the full samples, student and teacher participants rated Feedback among the most present of the SDS components. Individual site findings were more varied as student and teacher participants at sites A and C perceived Feedback to be highly present while at site B neither students nor teachers rated it as the most highly present component. Additionally at site B, Feedback was perceived as one of the least important SDS components by teacher participants. At site D, it was perceived as least present by teacher participants and most present by student participants.

Fidelity was perceived as one of the SDS components most present in the HFHPS experiences by the full sample of teachers. Results by site differed for this

component as well. Teachers at sites B, C, and D placed high value on Fidelity, but only teachers at site D perceived it to be highly present. Teachers at site A rated Fidelity as the least important SDS component. Student participants at site B perceived Fidelity as highly present as well, but students at site C rated it as the least present SDS component. The full sample of teachers rated High Expectations the least important EPSS component while students at three out of four sites and the full student sample rated it least present in HFHPS experiences.

Table 17

*Comparison of Student and Teacher Participant Lowest Rated SDS and EPSS Components by Site and Full Sample*

| | EPSS Importance Component | |
|---|---|---|
| Sample | Teachers | Students |
| Full Sample | High Expectations | All components equal |
| Site A | High Expectations | Active Learning |
| Site B | Active Learning | Collaboration |
| Site C | High Expectations | Diverse Learning Styles |
| Site D | Active Learning | Diverse Learning Styles |
| | EPSS Presence Component | |
| Full Sample | Active Learning | Active Learning |
| | Diverse Learning Styles | Diverse Learning Styles |
| | | High Expectations |

Table 17 – Continued

*Comparison of Student and Teacher Participant Lowest Rated SDS and EPSS Components by Site and Full Sample*

| Sample | EPSS Presence Component<br>Teachers | Students |
|---|---|---|
| Site A | Diverse Learning Styles | High Expectations |
| Site B | Active Learning | Diverse Learning Styles |
| Site C | Collaboration | High Expectations |
| Site D | Diverse Learning Styles | High Expectations |
| | SDS Importance Component | |
| Full Sample | Objectives | Problem solving |
| | Support | |
| Site A | Objectives | Objectives |
| | Fidelity | Problem solving |
| Site B | Support | Fidelity |
| | Feedback | |
| Site C | Support | Problem solving |
| Site D | Support | Problem solving |
| | SDS Presence Component | |
| Full Sample | Objectives | Objectives |
| | Support | Support |
| | Problem solving | Problem solving |
| | | Fidelity |

Table 17 – Continued

*Comparison of Student and Teacher Participant Lowest Rated SDS and EPSS Components by Site and Full Sample*

| | SDS Presence Component | |
|---|---|---|
| Sample | Teachers | Students |
| Site A | Objectives | Problem solving |
| Site B | Objectives | Problem solving |
| | Support | |
| | Fidelity | |
| Site C | Objectives | Fidelity |
| Site D | Feedback | Problem solving |

Table 18

*Comparison of Student and Teacher Participant Highest Rated SDS and EPSS Components by Site and Full Sample*

| | EPSS Importance Component | |
|---|---|---|
| Sample | Teachers | Students |
| Full Sample | Collaboration | All components equal |
| | Diverse Learning Styles | Problem solving |
| Site A | Collaboration | High Expectations |
| | Diverse Learning Styles | |
| Site B | Collaboration | High Expectations |
| | Diverse Learning Styles | Diverse Learning Styles |

Table 18 – Continued

*Comparison of Student and Teacher Participant Highest Rated SDS and EPSS Components by Site and Full Sample*

| | EPSS Importance Component | |
|---|---|---|
| Sample | Teachers | Students |
| Site C | Collaboration<br>Diverse Learning Styles | Collaboration |
| Site D | Diverse Learning Styles | High Expectations |
| | EPSS Presence Component | |
| Full Sample | Collaboration | Collaboration |
| Site A | Collaboration | Collaboration |
| Site B | Collaboration<br>Diverse Learning Styles<br>High Expectations | Collaboration |
| Site C | High Expectations | Collaboration |
| Site D | Collaboration | Collaboration |
| | SDS Importance Component | |
| Full Sample | Fidelity<br>Feedback<br>Problem solving | All components equal, except Problem solving rated lowest |
| Site A | Feedback | Feedback |
| Site B | Fidelity | Objectives |

Table 18 – Continued

*Comparison of Student and Teacher Participant Highest Rated SDS and EPSS Components by Site and Full Sample*

| | SDS Importance Component | |
|---|---|---|
| Sample | Teachers | Students |
| Site C | Fidelity | Support |
| Site D | Fidelity | Feedback |
| | SDS Presence Component | |
| Full Sample | Feedback<br>Fidelity | Feedback |
| Site A | Feedback | Feedback |
| Site B | Problem solving | Fidelity |
| Site C | Feedback | Feedback |
| Site D | Fidelity | Feedback |

*Summary*

In this chapter results were presented for this mixed methods study that examined nurse educator and nursing student perceptions of the best ways to prepare for and implement HFHPS. The final teacher sample consisted of 12 participants from four study sites. All participants were female with a mean age of 45.9 years and a mean of 3.7 years of experience with HFHPS. Participants reported using HFHPS in a wide range of nursing courses.

The student sample was drawn from four study sites and included 140 students, the majority of whom were female. Student participants ranged from 21-53 years of age and most fell into the Gen-X (29-47 years) age group. Most student participants rated themselves as having high comfort with technology. No significant correlations were found between age or age group and comfort with technology. However, comfort with technology correlated positively with satisfaction and self-confidence after the HFHPS experience. No significant correlations were found between age or age group and satisfaction or self-confidence.

Results for research question #1 indicated that teacher participants prepared for HFHPS through the themes of Learning Environment Readiness, Readiness to Facilitate Learning, and Student Readiness. Implementation of HFHPS was geared to the themes of Ensuring Fidelity, Self-Development, and Developing Students' Thinking Skills.

The EPSS-T and SDS-T Importance and Presence scales were used in research question #2 to measure the degree to which nursing faculty value and use educational best practices in HFHPS. Cronbach's alphas for all scales were indicative of strong internal consistency reliability. Mean and median values for each scale and the constituent components indicated teacher participants perceived educational best practices and simulation design characteristics were important and present in the HFHPS experiences in which their students participated. Importance means and medians for the EPSS-T and SDS-T scales were slightly higher than

means and medians for the Presence scales. The SDS-T Importance scale Fidelity component had the highest overall mean, but several other SDS-T and EPSS-T components – Feedback, Problem solving, and Diverse Learning Styles – had importance medians equal to Fidelity.

Research question #3 examined student participants' perceptions of the importance and presence of educational best practices in HFHPS using the EPSS-S and SDS-S instruments. Comparisons of Cronbach's alphas for these instruments with those from the NLN/Laerdal study (Jeffries & Rizzolo, 2006) showed similarly high internal consistency reliabilities. Based on the means and medians for the scales and components of the EPSS-S and SDS-S it was found that student participants perceived educational best practices and simulation design characteristics were important and present in the HFHPS experiences. This group had higher means and medians for the Importance scale of the SDS-S than the Presence scales. The EPSS-S Presence scale Collaboration component had the highest overall mean and median.

Student participants' perceptions of the HFHPS experience were described in research question #4. Preparation for the HFHPS experience included the themes of Gathering Information, Analyzing Information, and Demonstrating Understanding. Participants stated they prepared for the experience "as if it were a real patient". Information students needed from faculty prior to the HFHPS experience was encompassed by the themes of Patient Information, Expectations, and Orientation to

the Simulation Experience. Orientation to the Simulation Experience was comprised of the subthemes of Fidelity and Logistics.

Three themes emerged from the data on what student liked best about HFHPS – Learning from Mistakes, Preparation for Real Life, and Safe Environment. Themes for what students liked least about HFHPS included Surveillance, Fidelity Limitations, and Teaching/Learning Practices. Teaching/Learning Practices contained the four subthemes of Feeling Lost, Group Size, Time for Learning, and Negative Behaviors. The value student participants placed on the elements measured by the EPSS-S and SDS-S instruments was supported through comparison to the themes from the qualitative data.

Student participants' satisfaction and self-confidence after a HFHPS experience were addressed in research question #5. Correlations of the LSS and LSCS to the EPSS-S and SDS-S Presence and Importance scales showed moderate correlations between the Importance scales of both instruments and the LSS and LSCS. Strong correlations existed between the EPSS-S and SDS-S Presence scales and LSS and LSCS.

In research question #6 student and teacher participants' themes and patterns from the qualitative data were compared. Similarities were found in both groups' themes for what was liked best. Teacher participants' themes of Student Evaluation, Preparation for Real Life, and Safe Environment had many parallels with the student participant themes of Learning from Mistakes, Preparation for Real Life, and Safe Environment. The themes for dislikes or drawbacks to HFHPS had fewer

commonalities although the student theme of Fidelity Limitations was similar to the teacher's Simulation Acceptance theme.

Based on the means and medians for the EPSS and SDS Presence and Importance scales and their constituent components, the results for research question #7 showed that both groups perceived educational best practices and simulation design characteristics represented in the Nursing Education Simulation Framework (Jeffries, 2005) were present and important in the HFHPS experiences. In general, teacher participant means and medians for the EPSS and SDS Presence and Importance scales and their components were higher than for student participants.

Similarities between the groups for the full sample included higher means and medians on the Importance scales of the SDS than on the Presence scales, agreement on Collaboration as the highest component mean and median for the EPSS Presence scale, and a higher mean and median for the component of Feedback on the SDS Presence scales. Differences between the groups included a lower mean and median on the SDS Importance scale for the component of Support from teacher participants and a higher mean and median for this component from student participants.

Comparison of student and teacher participants by site revealed the component of Collaboration with the highest mean and median for the EPSS Presence scale at all sites, except site C. A number of differences between the sites were also found. For example, the Feedback component on the SDS Presence scales

had the highest means for student and teacher participants at sites A and C, but was not found to be as highly rated by both groups at the other sites.

The rich, detailed findings from the qualitative data and the results from the quantitative data in this mixed methods study provided an abundance of information for answering the seven research questions. This multidimensional description of the implementation of HFHPS can be used by faculty to provide effective HFHPS experiences in nursing education.

# Chapter Five: Discussion, Conclusions, and Recommendations

## *Introduction*

The purpose of this study was to examine nurse educator and nursing student perceptions of the best ways to prepare for and implement high fidelity human patient simulation (HFHPS). Data were collected through electronic surveys from students and teachers involved in ADN programs at five community colleges across the United States. Seven research questions were proposed:

1. How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education?
2. To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?
3. To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation experiences?
4. What are associate degree nursing students' perceptions of the experience of high fidelity human patient simulation?
5. What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perceptions of the value and importance of educational best practices and simulation design characteristics?

6. Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high fidelity human patient simulation?
7. What is the relationship between associate degree nursing faculty and nursing students' perceptions of the importance and presence of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?

*Preparation for and Implementation of High Fidelity Human Patient Simulation*

The mixed methods design of the study was significant because it provided a multidimensional description of how HFHPS is implemented, which can be used by faculty in making the most effective use of HFHPS in nursing education. The nursing education simulation framework (NESF) (Jeffries, 2005), based on Chickering and Gamson's (1987) principles of best practice in undergraduate education provided the theoretical structure for the study. Analysis of the quantitative and qualitative data collected to answer the seven research questions produced a multidimensional picture of the preparation and implementation of HFHPS in associate degree nursing programs.

The results indicated that nurse educators and nursing students agreed that educational best practices were important and were being used in the planning and implementation of HFHPS. Feedback and fidelity in HFHPS experiences were particularly important to faculty and students. Students preferred to work in smaller groups during the simulation to increase their opportunities for hands-on experience.

In addition, nursing students were more satisfied and self-confident after HFHPS experiences in which they perceived a greater presence of educational best practices. Congruency in the HFHPS positive characteristics themes for both groups was found, although there were some distinct differences in specific educational practices and simulation design characteristics most valued by each group.

Nurse educators prepared and implemented HFHPS with the outcomes listed below, and nursing students concurred with the outcomes.

1) Improving students' critical thinking and clinical reasoning by allowing them to make mistakes and learn from them through feedback from faculty and self-reflection.
2) Creating clinical experiences not available to students in other clinical settings.
3) Preparing students for real life practice experiences by allowing them to fully practice the role of the registered nurse.

Nurse educators used many resources to learn about planning and implementing HFHPS, but most often the actual process of planning and implementing was through trial and error as faculty worked to improve HFHPS based on their experiences. To meet their intended learning outcomes, faculty placed great importance on preparing a simulation environment that was as realistic as possible. They also facilitated learning by orienting students to the simulation process and technology, providing information about the simulated patient, and

giving pre-simulation assignments geared to the simulation objectives. A detailed discussion of the findings is presented under each research question.

*Discussion*

*Research Question #1*

How do associate degree nursing faculty prepare for and implement high fidelity human patient simulation in nursing education?

The data collected from the Teacher Open-ended questionnaire (Appendix L) yielded the Preparation and Implementation themes used to answer this research question. Preparation themes included 1) Learning Environment Readiness, 2) Readiness to Facilitate Learning, and 3) Student Readiness. Implementation themes were 1) Ensuring Fidelity, 2) Self-Development, and 3) Developing Students' Thinking Skills. These themes and their descriptors are also provided in Appendix M.

There were definite parallels in the themes found for teacher preparation for and implementation of HFHPS. Preparation theme 1) Learning Environment Readiness, which described preparing the manikins and getting equipment and supplies in place and operational, was continued in Implementation theme 1) Ensuring Fidelity, as teachers stated their goal was to replicate "real-life patient situations".

Preparation theme 2) Readiness to Facilitate Learning focused on best educational practices in general rather than being specifically related to the intricacies of HFHPS. Teachers' awareness of the importance of objectives and

recognition of students' strengths and weaknesses in order to provide appropriate support can be directly connected to the nursing education simulation framework (NESF) (Jeffries, 2005). Implementation theme 2) Self-Development, was also geared to best educational practices, but concentrated on activities specific to HFHPS, such as attending workshops, observing HFHPS, and studying the literature on simulation. Also included in this theme was the idea of learning to improve implementation of HFHPS through experience. These two themes appeared to be very closely connected for teacher participants because many of the activities described were actually precursors to implementing HFHPS, but teachers viewed them as part of the implementation process.

Preparation theme 3) Student Readiness, included best educational practices of setting high expectations, giving support, and improving time on task by providing students with an orientation to the simulation environment, clear objectives for the experience, and adequate information about the patient. The preparation set the stage for Implementation theme 3) Developing Students' Thinking Skills as active learning and problem-solving were present in the responses from which this theme emerged.

The themes that emerged from the data regarding how teachers prepare for and implement HFHPS represented best educational practices and simulation design characteristics supporting the NESF (Jeffries, 2005). The relationships found between the Preparation and Implementation themes demonstrated that an integrated process was used by teachers in delivering HFHPS experiences to students.

*Research Question #2*

To what degree do associate degree nursing faculty value and use educational best practices in human patient simulation in nursing education?

Based on a five point scale, all means and medians for the teacher versions of the Educational Practices in Simulation Scale (EPSS-T) and the Simulation Design Scale (SDS-T) and their components were greater than four (Table 5). In fact, tests of normality for the teacher participant data showed it to be highly skewed toward higher scores for all scales and components of the EPSS-T and SDS-T instruments. A review of these instruments (Appendices J and K) shows that for the Importance scales of the EPSS-T and SDS-T scores of 4 and 5 for item statements represent ratings of “Important” and “Very Important”, respectively. On the Presence scales of the two instruments, a score of 4 corresponds to “Agree with the Statement” and 5 means “Strongly Agree with the Statement”.

The results also showed the Importance scales for the SDS-T and the EPSS-T had slightly higher means and medians overall than the Presence scales of the instruments. Fidelity and Feedback, components of the SDS-T, were highly valued and perceived to be highly present by teacher participants. Collaboration, a component of the EPSS-T, was also perceived to be strongly present and very important to the sample participants.

These findings suggest that teachers recognized and highly valued educational best practices and simulation design characteristics, but were less sure

they were being incorporated into HFHPS experiences. The preparation and implementation themes described in research question #1 support this proposition. Educational best practices and simulation design characteristics were clearly valued by teacher participants, but Implementation theme 1) Self-Development gives insight into why teacher participants may have perceived them to be less present in HFHPS experiences. Teacher participants described much of their development in implementing HFHPS as “trial and error”, which would seem to indicate a lack of complete satisfaction with the simulation experience produced and could explain why EPSS-T and SDS-T Presence means and medians were lower than Importance means and medians for those scales. The high degree of collaboration, feedback, and fidelity perceived to be present in the HFHPS experiences may represent elements of the simulation experience that were more easily recognizable or with which teacher participants were more satisfied.

*Research Question #3*

To what degree do associate degree nursing students perceive the presence and importance of educational best practices in high fidelity human patient simulation experiences?

All means for the scales and components of the student versions of the Educational Practices in Simulation Scales (EPSS-S) and the Simulation Design Scale (SDS-S) were at or above 3.82 with all medians at or above 4.0 (Table 7). As was the case with the teacher sample, tests of normality showed the distribution of data was skewed toward higher scores for all scales and components of the EPSS-S,

SDS-S, Student Satisfaction with Learning Scale (LSS), and Student Self-Confidence in Learning Scale (LSCS) instruments. The rating scales for EPSS-S and SDS-S (Appendices F and G) indicate that for the Presence scales of both instruments a score of 4 means “Agree with the Statement”. A score of 4 on the Importance scales corresponds to “Important” as a rating for the item statement.

Descriptive statistics showed the means and medians for the EPSS-S and the SDS-S Importance scales were slightly higher than the means and medians for the Presence scales. Student participants also appeared to find a strong presence of the SDS-S component Feedback and the EPSS-S component Collaboration. In addition, LSS and LSCS means and medians indicated general satisfaction and self-confidence after HFHPS experiences.

These findings suggest that student participants recognized and valued educational best practices and simulation design characteristics, but were less sure they were being incorporated into HFHPS experiences. Student participants were also more certain that feedback and collaboration were present in their HPHPS experiences. Further support for this proposition will be presented in the discussion for research question #4.

*Research Question #4*

What are associate degree nursing students’ perceptions of the experience of high fidelity human patient simulation?

The Student Open-ended questionnaire (Appendix I) was used to collect data for this research question. The student experience was examined from the

perspectives of preparation for HFHPS, information needed from faculty prior to the HFHPS, and positive and negative characteristics of HFHPS. Themes that emerged from the qualitative data were compared to the components of the EPSS-S and SDS-S. Appendix N contains themes and their descriptors for this research question matched to EPSS-S and SDS-S components.

Student Preparation themes were 1) Gathering Information, 2) Analyzing Information, and 3) Demonstrating Understanding. These themes showed that preparation for HFHPS is very similar to the way students prepare for clinical experiences with real patients. Indeed responses such as “prepare as we do for normal clinical days” and prepare “as if it were a real patient”, say exactly that.

Student Information Needed themes were 1) Patient Information, 2) Expectations, and 3) Orientation to the Simulation Experience. Information theme 1) Patient Information fit well with the Preparation themes as students needed information about the patient in order to prepare. Of note were comments from three student participants that indicated receiving less information improved the learning experience because it increased the similarity to real RN practice and allowed students to use more problem-solving skills. This was an exception rather than the norm.

The responses for Student Information Needed themes 2) Expectations and 3) Orientation to the Simulation Experience were more specific to HFHPS. Student participants wanted to be very clear about the skills they were expected to perform and the knowledge required for the experience. Fidelity, a sub-theme of Information

Needed theme 3) Orientation, focused specifically on the characteristics and limitations of high fidelity manikins and emphasized distinct differences between HFHPS and clinical experiences involving real patients. However, with any type of clinical experience students desire to know what is expected of them and to be oriented to the environment in which the experience will take place.

The Student Positive Characteristics themes of 1) Learning from Mistakes, 2) Safe Environment, and 3) Preparation for Real Life clearly illustrated advantages of HFHPS over other types of clinical experiences. Most commonly found in the data was Positive Characteristics theme 1) Learning from Mistakes, as students described being allowed to make mistakes and learn from the experience through self-reflection and debriefing. Positive Characteristics themes 1) Learning from Mistakes and 2) Safe Environment, were closely related as students liked being able to practice nursing in an environment free of the risk of harming patients if a mistake was made. HFHPS experiences created opportunities for learning that could not be intentionally replicated with live patients.

The Student Positive Characteristics theme 3) Preparation for Real Life was multifaceted as it included the fidelity of the experience, exposure to experiences prior to working with real patients or not available in traditional clinical settings, opportunities to critically think through a situation, and opportunities to work independently of faculty or to work as a team with other students. One student's description of the opportunity to work through a cardiac emergency exemplified this theme. "I feel that this was the most beneficial experience for me because it was the

most life threatening and the scariest to be unprepared for in the real world. Simulation gives us the opportunity to have a variety of situations we may not have encountered in school."

Experiences such as these are often unavailable in clinical settings with real patients due to safety concerns or student overcrowding at a site, yet they represent the type of practice students are expected to demonstrate upon graduation from their nursing programs (AACN, 2003; National League for Nursing- Accrediting Commission (NLN-AC), 2006; The Advisory Board Company, 2008).

Student Negative Characteristics themes were 1) Surveillance, 2) Fidelity Limitations, and 3) Teaching/Learning Practices. Videotaping and observation of the HFHPS experience by faculty and simulation lab technicians are common practices in simulation. However, students expressed a strong dislike of being watched, which is represented in Negative Characteristics theme 1) Surveillance. Students' anxiety was increased because they worried about performing perfectly or being ridiculed by unseen observers. Being observed during clinical experiences is a common source of anxiety for students (Bond, 2009), thus identification of Negative Characteristics theme 1) Surveillance was not surprising. Negative Characteristics theme 2) Fidelity Limitations was comprised of the limitations of the simulator manikin and the student's difficulty in suspending disbelief. As such, it represented a limitation inherent in any type of simulation experience.

Negative Characteristics theme 3) Teaching/Learning Practices theme had four distinct subthemes – A) Group Size, B) Feeling Lost, C) Time for Learning, and

D) Negative Behaviors. These subthemes supported the need for best educational practices in HFHPS as each one pointed toward a lack of these practices. The Group Size subtheme emphasized that having too many students in a HFHPS experience decreased opportunities for active involvement and problem-solving. Poor orientation to the simulation laboratory and manikins as well as uncertainty of the expectations for the simulation experience and for their actions contributed to the subtheme Feeling Lost. Another factor in the Feeling Lost subtheme was the perception of the simulation scenario being too complex for the student's current level of knowledge. In both instances, students perceived the need for improved support in the learning experience.

The amount of time spent in a single simulation and the number of simulation experiences offered were judged to be too little in the Time for Learning subtheme, although a minority of student participants believed HFHPS experiences took away time that should have been used for experiences with real patients. There was also disagreement about the amount of time spent on pre-simulation assignments as comments ranged from "it is too time consuming" to the desire for more time to discuss the assignment with the instructor prior to the simulation.

The Negative Behaviors subtheme focused mainly on feelings of being belittled or humiliated by faculty during the HFHPS experience. A lack of faculty competency in using the simulator technology was also part of this subtheme.

In summary, the themes that emerged from the data created a multidimensional picture of the HFHPS experience from the student's perspective.

Preparation themes indicated students prepare for HFHPS in much the same way as they prepare for other clinical experiences. Information Needed themes showed that as with any kind of clinical experience students desire information about their assigned patients and details about the learning environment in which they will provide care. The Positive Characteristics themes indicated students liked being able to experience all aspects of the RN role while learning from their mistakes in a safe environment. The themes for Negative Characteristics were diverse and represented some elements that were unique to simulation, such as the Fidelity Limitations theme as well as elements common to any type of clinical educational experience as demonstrated by the Surveillance and Teaching/Learning Practices themes.

The themes from the qualitative analysis were compared to the components of the scales of the EPSS-S and SDS-S. As described in research question #3 means for the Importance scales of the EPSS-S and SDS-S were higher than means for the Presence scales. However, the means and medians for all EPSS-S and SDS-S scales and components indicated student participants perceived the educational best practices and simulation design characteristics measured by the instruments were important and present in HFHPS experiences. The results of the comparisons confirmed the description of the student perspective of HFHPS when congruency was found between qualitative themes and components of the EPSS-S and SDS-S (Appendix N).

In addition, the higher scores on the Importance scales linked with the lower scores on the Presence scales for both instruments may indicate student participants

found the HFHPS experiences lacked to some extent the educational best practices and simulation design elements they valued. The themes for what students liked least about HFHPS experiences shown in Appendix N provide examples of possible decreased use of educational best practices and simulation design elements by nurse educators, and support this conclusion.

The description of the student participant Negative Characteristics theme 1) Surveillance, demonstrated student participants did not feel supported and were concerned the high expectations of faculty could not be met. Negative Characteristics theme 2) Fidelity Limitations clearly showed the SDS component of Fidelity was lacking. The description of Negative Characteristics theme 3) Teaching/Learning Practices demonstrated HFHPS experiences in which the EPSS component Active Learning and the SDS components Objectives, Feedback, and Support were perceived as lacking.

The student participant results may also explain why satisfaction and self-confidence ratings (Table 7) as measured by the LSS and LSCS (Appendix H), while indicative of overall satisfaction and self-confidence were not higher.

*Research Question #5*

What is the relationship between associate degree nursing students' satisfaction and self-confidence after a high fidelity human patient simulation experience and their perceptions of the presence and importance of educational best practices and simulation design characteristics?

Significant positive relationships were found between the variables of satisfaction and self-confidence and the presence and importance of educational best practices and simulation design characteristics (Table 10). The presence of educational best practices and simulation design characteristics in the HFHPS experiences had a stronger relationship to satisfaction and self-confidence than the degree of importance students placed upon best practices and design characteristics. Although a cause and effect relationship cannot be determined from correlation statistics, the results for this research question present important information for faculty involved in HFHPS by showing that student satisfaction and self-confidence were higher after HFHPS experiences perceived to include educational best practices and simulation design characteristics.

*Research Question #6*

Do associate degree nursing faculty and nursing students have similar perceptions of important characteristics of high fidelity human patient simulation?

The themes found in the qualitative data for student and teacher participants (Table 11) were very similar for the positive characteristics of HFHPS. Teacher Positive Characteristics themes were 1) Student Evaluation, 2) Preparation for Real Life, and 3) Safe Environment. Student Positive Characteristics themes were 1) Learning from Mistakes, 2) Preparation for Real Life, and 3) Safe Environment.

In Teacher Positive Characteristics theme 1) Student Evaluation, teachers described being better able to facilitate learning because they could spend more time observing student performance and helping process the experience. In Student

Positive Characteristics theme 1) Learning from Mistakes, student participants commented that the feedback from faculty contributed to their learning from mistakes made during the HFHPS. Both groups described how students were better able to reflect and learn from the simulation experience during debriefing.

In the second Student and Teacher Positive Characteristics theme, Preparation for Real Life, responses from both groups related to the student's ability to fully practice the role of the RN and develop clinical decision-making skills. Student and teacher participants recognized that a degree of stress was present in the HFHPS experience as a result of the autonomy the experiences provided to students, but also acknowledged the benefits for future practice gained from the stress. The Student and Teacher Positive theme, Safe Environment, emphasized patient safety and a non-threatening atmosphere for both groups.

Similarities were also found between the Student Negative Characteristics theme 1) Fidelity Limitations and Teacher Negative Characteristics theme 1) Simulation Acceptance. Teacher participants indicated awareness of the problem students had with putting aside limitations of the high fidelity simulators and focusing on the quality of learning that was possible with this technology. One other similarity in the Negative Characteristics themes was that both groups described students' pre-simulation assignments as taking too much time for students to complete. The Student Negative Characteristics theme, Teaching/Learning Practices and the Teacher Negative Characteristics theme, Time Expenditure, both included this characteristic.

The similarities in the student and teacher participant themes demonstrated the strong congruency in the perceptions of both groups about important characteristics of HFHPS. In particular, teacher participants' awareness of the difficulty students had with gaining the most learning from the HFHPS experience due to innate limitations of simulation is an important finding. This awareness can encourage faculty to consciously include details in the simulation experience that may improve fidelity, such as odors a nurse might encounter in caring for an incontinent patient or sounds a patient experiencing pain would make. In addition, faculty can encourage students' acceptance of the level of fidelity by pointing out the strong similarities to real patients demonstrated by the ability of the simulator manikins to blink their eyes, or change the rate and rhythm of respirations and heartbeat.

The dissimilarities in the other Negative Characteristics themes for student and teacher participants were likely related to the differing roles of each group in the HFHPS experience. Teacher Negative Characteristics theme 2) Time Expenditure focused mainly on the time-consuming nature of preparing for, implementing, and evaluating HFHPS with students. Increased workload was an important factor in this theme as well as a perceived lack of understanding of workload issues by faculty not involved in simulation. Student Negative Characteristics themes, Surveillance and Teaching/Learning Practices concentrated on such things as feeling pressured to perform perfectly while being observed, feeling humiliated, feeling rushed, and feeling that learning opportunities were being compromised.

The workload issues brought up in the Teacher Negative Characteristics theme, Time Expenditure, are important to recognize as they have an impact on the continued development and use of HFHPS in nursing curricula. Faculty who implement HFHPS have the potential to burn out and discontinue using simulation with students. This problem is two-fold as knowledge accumulated by experienced faculty and the opportunities for the rich learning experiences possible with HFHPS may be lost.

The feelings described in the Student Negative Characteristics themes, Surveillance and Teaching/Learning Practices point out the need for careful attention to educational best practices when designing and implementing HFHPS. The teacher participants' responses acknowledged students could be anxious and stressed during HFHPS experiences. However, none of their responses indicated they were fully aware of the level of stress and anxiety students experienced or the specific practices that appeared to cause stress and anxiety.

Comparison of the teacher participant Positive Characteristics theme, Student Evaluation, to the student participant Negative Characteristics theme, Surveillance, is a clear example of the different perceptions of the two groups. Student participants disliked being observed and videotaped during the HFHPS experience because they feared unseen observers would ridicule them and expect a flawless performance. In contrast, teacher participants valued the greater opportunities to see students in action and provide feedback in a non-threatening environment.

These findings suggest opportunities for improving HFHPS experiences. Emphasizing the non-threatening nature of the observation or videotaping and the opportunities they provide for positive feedback and self-reflection are important. Showing students what happens on the other side of the glass during a simulation may relieve fears and reduce anxiety.

Student concerns about rushing through the simulation scenario or missing clinical experiences with live patients can be addressed prior to the HFHPS experience. Faculty can defuse student concerns by explaining that under the right circumstances much learning can occur in a short period of time. Raising faculty awareness of student perspectives creates the opportunity to help students better understand the positive aspects of HFHPS and can lead to more effective use of HFHPS as a learning tool.

*Research Question #7*

What is the relationship between associate degree nursing faculty and nursing students' perceptions of the presence and importance of best educational practices and simulation design characteristics in high fidelity human patient simulation experiences?

*Comparison of teacher and student participant results from the full sample.* Student and teacher participants perceived educational best practices and simulation design characteristics as represented in the Nursing Education Simulation Framework (NESF) (Jeffries, 2005) were present and were important in the HFHPS experiences, and both groups had higher means and medians on the Importance

scales of the SDS than on the Presence scales. Teacher participants' total score mean and median on the EPSS-T Importance scale were also higher than total score mean and median on the EPSS-T Presence scale. Student participant medians for total scores on the EPSS-S Importance and Presence scales were equal, although the EPSS-S Importance mean for total scores was slightly higher than the Presence mean. The EPSS Presence scale component of Collaboration was perceived most highly by both groups followed by the SDS Presence scale component of Feedback.

These findings suggest both groups placed importance on NESF educational best practices and simulation design characteristics, but may have been less sure these elements were present in the HFHPS experiences in which they were involved. Support for this interpretation was presented earlier in the discussion for research question #2 and research question #5.

Overall, teacher participants' means and medians for the EPSS and SDS Presence and Importance scales and components were higher than for student participants. Several factors could explain this finding. The qualitative data and themes for teacher participants revealed teachers believed strongly in the quality of HFHPS as a way to prepare students for practice and supported the high means and medians found in the quantitative data. The teacher sample size was small compared to the student sample, and although participants came from geographically dispersed sites they appeared to be a homogeneous group.

In contrast, the student sample was larger and characteristics of the participants, such as age and gender, were more diverse. The qualitative data for

student participants also demonstrated a greater variety and range of responses than the teacher participant data. The quantitative data showed that although the means for satisfaction and self-confidence were indicative of general satisfaction and self-confidence after HFHPS experiences, they were lower than the means for all other variables measured in this study. The medians for satisfaction and self-confidence were equal to the lowest medians found for particular scales and components of the EPSS-S and SDS-S. In addition, the results showed satisfaction and self-confidence were strongly correlated with the presence of educational best practices and simulation design characteristics. All of these factors combined likely account for the means and medians for student participants being lower than for teacher participants.

The findings for the components of the EPSS and SDS scales revealed the EPSS component of Collaboration and the SDS component of Feedback were highly valued and perceived as most present by both groups. Fidelity was important to both groups, but teacher participants perceived its presence to be greater than did student participants. High Expectations had the lowest value of the EPSS components for teachers, and students perceived it to be among the least present components.

The similarities in teacher and student participant results demonstrate elements of the HFHPS experiences where best practices appeared to be most present. The differences may be related to the elements in which each group of participants was most invested. The qualitative data for teacher participants suggested that incorporating problem solving and fidelity into the simulation was

very important. In contrast, student participants' qualitative data showed they desired support and feedback during the HFHPS experience.

In the case of fidelity, teacher participants were likely to be more aware of the full capabilities of the simulator manikins and their own efforts to increase fidelity in the simulation. Qualitative data for student participants illustrated that some students had expectations for the fidelity of the experience that were beyond the currently available simulation technology. One student participant's description of the manikin's "cold plastic feet and skin that can't be pierced" is a good example of expectations that are not yet technologically available.

*Differences and similarities in the study sites and the full sample.* When the quantitative results for individual study sites were compared to each other and to the full sample, the researcher found a number of similarities. The similarities in the findings for each study site appear to confirm some of the results from the full sample and decrease any concern that data from a site or sites comprising a larger proportion of the full sample could have skewed the results.

Student and teacher participants at each site valued educational best practices and simulation design characteristics, and perceived them to be present in HFHPS experiences. Teacher participant means and medians at each site were higher than for student participants. Collaboration was among the most valued EPSS components for teacher participants at all sites, except site D, and the most present EPSS component for student participants at each site. These findings were consistent with the results from the full sample.

The differences between sites were similar to the differences found between student and teacher groups in the full sample and were focused mainly on the SDS components Feedback and Fidelity. Feedback was rated as highly present by the full samples of students and teachers. However, when the data were broken down by site, student and teacher participants at sites A and C agreed Feedback was highly present while teachers at sites B and D agreed it was not the most present component in HFHPS experiences.

Fidelity was also perceived as among the SDS components most present in HFHPS experiences by the full sample of teachers, but for the full student sample it was rated among the least present SDS components. The results from each site were quite different as teacher participants at sites B, C, and D highly valued Fidelity, but only site D teachers perceived it to be highly present. Student participants at site B perceived Fidelity as highly present, but site C students rated it as the least present SDS component. For sites A and D students, Fidelity was neither the highest nor the lowest rated SDS Presence component.

The differences in findings for each study site were more difficult to interpret. There does appear to be some consistency within sites indicating students and teachers had similar perceptions of the SDS components of Feedback and Fidelity. In several instances results for one of the sites with fewer student and teacher participants were similar to the results for one of the sites with larger samples. For example, student and teacher participants at sites A and C perceived Feedback as the most present SDS component. Additionally, teacher participants at

sites C and D valued the SDS component of Support least and student participants at these sites agreed that Problem solving was least important. These similarities between sites also support the conclusion that no one site had more influence on the results.

*Comparison of Study Findings to the Extant Literature*

Several results of this study supported the findings of previous research on HFHPS. The high satisfaction after HFHPS experiences reported by students in this study was also found by Alinier, et al. (2006), Bearnson and Wiker (2005), Becker, et al. (2006), Bruce, et al. (2003), Childs and Sepples (2006), Feingold, et al. (2004), Fountain and Alfred (2009), Gates, et al. (2001), Gibbons, et al. (2002), Hoadley (2009), Henneman and Cunningham (2005), Jeffries and Rizzolo (2006), Kardong-Edgren, et al. (2008), Rhodes and Curran (2005), and Smith and Roehrs (2009). Students in this study reported high self-confidence after HFHPS experiences, which was also described in the literature (Alinier, et al.; Fountain & Alfred; Goldenberg, et al., 2005; Hoadley; Jeffries & Rizzolo; Kardong-Edgren, et al.; Leigh, 2008; Michael, 2005; Moran, 2009; Ravert ,2004; Smith & Roehrs).

The high value students placed on fidelity was also found by Childs and Sepples (2006). Feedback, an important HFHPS component for students in this study, was also shown to be important by Childs, Sepples, and Hoadley (2009). Giving feedback to students, which was recommended by Billings and Halstead (2005), Chickering and Gamson (1987) and Fink (2003) was also important to faculty in this study and demonstrated the use of educational best practices in

HFHPS experiences. Faculty in this study also placed high importance on orienting students to the simulation experience, which corresponded to recommendations by Childs, Sepples, Comer (2005) and Jeffries (2007).

Research on the roles assigned to students during HFHPS experiences is limited. However, Jeffries and Rizzolo (2006) found that students placed in observer roles reported the same satisfaction and self-confidence as students giving direct care during the simulation. In contrast, students in this study favored small groups that allowed each student to give hands-on care during HFHPS experiences.

Several findings from this study were not described in the literature. Surveillance, defined as videotaping or observation of the HFHPS experience, emerged as an important concept in this study. Students strongly disliked being watched or videotaped by unseen observers. Their fears of humiliation, ridicule, and being expected to perform perfectly during the simulation influenced their feelings about surveillance. The only other reference to videotaping found in the literature was Jeffries' (2007) recommendation to use it to facilitate learners' self-reflection after HFHPS experiences.

"Pre-briefing", a term found in the nurse educator data for this study, included student and faculty discussion of pre-simulation assignments prior to beginning the simulation as well as giving information to students in a format similar to a change of shift report. Student data indicated the practice of "pre-briefing" facilitated their learning during the simulation. While Gaberson and Oermann (2007) described the use of preclinical conferences in other clinical settings, they did

not discuss it in the context of simulation. No other references to “pre-briefing” or preclinical conferences were found in the simulation literature.

Billings and Halstead (2005) and Palloff and Pratt (2001) suggested that some students may be less comfortable with simulation technology than others due to characteristics associated with different age groups (Baby Boomers, Gen-Xers, and Millennials). However, no results had been reported in the literature to support or refute this suggestion. The results of this study showed there was no significant relationship between age or age group and comfort with technology. In addition, comfort with technology was only weakly correlated to satisfaction and self-confidence after HFHPS experiences.

*Implications for Nurse Educators*

The results of this study demonstrated nurse educators and nursing students perceived best educational practices were being used in high fidelity human patient simulation experiences. Orientation emerged as an essential element for quality HFHPS learning experiences. Based on the results, the researcher compiled a Checklist for Orienting Students to the HFHPS Experience (Appendix O) that nurse educators may find useful. Items on the checklist were drawn from the data collected through the open-ended questionnaires completed by nursing students and nurse educators.

Surveillance, the videotaping and/or presence of unseen observers during HFHPS experiences, was a particular stressor for students. Faculty, on the other

hand, believed surveillance during HFHPS experiences improved their abilities to fully evaluate students and appeared unaware of the anxiety produced in students.

Faculty need to help students understand how surveillance can improve the opportunities to learn from mistakes and to process and reflect on what happened during the HFHPS experience. Increased transparency about how videotapes are to be used and what unseen observers are doing during the simulation is important. Giving students a behind the scenes demonstration of the activities of faculty and simulation operators during simulations may decrease the negative perceptions students have of surveillance.

As HFHPS has gained popularity in nursing education, more nursing programs are adding simulators, but do not necessarily have faculty experienced with HFHPS to implement simulations with students. The sites used in this study were well equipped for the delivery of HFHPS and faculty at these sites had a minimum of two years of experience with HFHPS. Nurse educators in this study used self-development methods to prepare themselves for HFHPS. However, they appeared to be unaware of particular aspects of the HFHPS experience that increased students' stress and anxiety. Based on nurse educators' statements about the "trial and error" nature of HFHPS implementation, decreased awareness of the student perspective, and the correlation of student satisfaction and self-confidence with a greater presence of educational best practices, some recommendations are suggested.

Both new and experienced simulation faculty can benefit from networking to share ideas and discuss questions that arise related to HFHPS. The International

Association for Clinical Simulation and Learning (INACSL) promotes the development of clinical simulation and learning resource centers, publishes the online journal, *Clinical Simulation in Nursing*, and encourages faculty networking.

Educators can benefit from a more systematic approach to development by using resources that assemble current knowledge of evidence-based practices in HFHPS in one location. The NLN's Simulation Innovation Resource Center (SIRC) is an online e-learning site dedicated to faculty development in HFHPS. The SIRC contains links to simulation centers nationwide and offers HFHPS learning modules and other resources for nurse educators.

An additional recommendation for nurse educators involved in the planning and implementation of HFHPS is to fully experience the student role. Nowhere in the data from this study or in the simulation literature did the researcher find any mention of faculty experiencing HFHPS first-hand. During the journey of immersion in HFHPS the researcher participated with other nurse educators in the full student experience of HFHPS from orientation, to pre-briefing, through the actual simulation, and into debriefing. The experience was invaluable in helping the researcher understand the negative aspects as well as the great learning opportunities of HFHPS students in the study expressed.

Workload issues for nurse educators responsible for HFHPS must be considered. Communication between simulation faculty and other clinical faculty is important. Creating work groups of faculty members with different clinical assignments – simulation and non-simulation – can encourage better communication

and understanding of workload. Another outcome of such work groups can be improved linkage between simulation and live patient clinical experiences, which ultimately benefits students by better preparing them for the complexities of practice they will face as practicing registered nurses.

*Limitations of the Study*

The descriptive correlational design of the quantitative portion of the study did not allow for cause and effect interpretations of the data in terms of the impact of teachers' educational practices on learner self-confidence and satisfaction. No attempt was made to control study eligibility of teacher or student participants based on the number of experiences with high fidelity human patient simulation, which could have an impact each group's responses to the simulation experiences (Shadish, et al., 2002).

The final sample size for nurse educators was small and less than expected. Due to the richness of the data collected from the open-ended questionnaires, the sample size was adequate for the qualitative portion of the study. However, the number of nurse educators completing the quantitative instruments fell short of giving adequate power to that portion of the study. Therefore the usefulness of the nurse educator quantitative data was decreased. The question also arises as to how the six nurse educators who completed the demographic portion of the online surveys might have differed in their responses to the other survey instruments and influenced the results of the study.

The self-report nature of the study was a limitation as there may be differences in the perceptions of HFHPS of nursing students and nurse educators who chose to participate in the study and those who did not. Of particular note is the fact that fewer students than projected participated from two of the sites, and one site had no nurse educators or nursing students choose to participate in the study. The simulation lab director at the site that had no participants emailed the researcher and appeared to be aware of the poor response. She stated she was sorry about the response, but offered no reason for it.

Many of these limitations were related to the fact that the use of high fidelity simulation in nursing education is new and nursing programs are in the early stages of adopting it in their curricula. Research on high fidelity simulation is still somewhat limited for that reason, which means that the design and sampling plan for this study were appropriate for building the foundation of knowledge in this area (Shadish, et al., 2002).

*Strengths of the Study*

The study looked at populations – associate degree nursing students and faculty – that are underrepresented in the literature, but contribute the largest number of registered nurse graduates and use high fidelity simulation more than other types of nursing programs. Data were collected from multiple, geographically dispersed sites and results from each site were compared. The similarities in the results from each site showed they were not unique to one school or small area of the country.

Students and faculty from each site participated in the study and their results were compared. No studies on high fidelity simulation were found in the literature that took this approach. Comparison of the student and teacher participant results provided a clearer and more strongly supported description of the methods faculty use to plan and implement high fidelity simulations. Qualitative research methods coupled with measurement instruments adapted from existing instruments with a strong foundation in educational research were a satisfactory way to begin developing the knowledge in this area (Creswell & Plano Clark, 2007).

*Future Research*

The literature about the use of high fidelity human patient simulation in nursing education is growing. So far, much of the information is anecdotal or limited to small samples at one research site. Future research in the area of HFHPS may include studying a larger sample of nurse educators to determine their perceptions of best practices in HFHPS. Research of this type could also provide an opportunity for further testing of the teacher versions of the Educational Practices in Simulation Scale and Simulation Design Scale. An area of concern that emerged from this research study was the faculty workload associated with planning and implementing HFHPS. Further study of this issue could yield information on more time effective ways to include HFHPS in nursing curricula.

Research that focuses on student outcomes such as critical thinking scores, readiness for practice, and success on the National Council Licensure Examination (NCLEX) is needed in addition to the research already available on student

satisfaction and self-confidence. A study comparing the above outcomes for nursing programs that use the traditional clinical model to programs that also provide students with HFHPS clinical experiences could add significantly to the body of knowledge on effective nursing education.

*Conclusions and Final Thoughts*

Nursing education programs are challenged to prepare graduates who are ready for the complexities of the health care environment. The issues of patient safety, quality of care, and the nursing shortage are driving forces in the development of nursing curricula that can produce greater numbers of well-prepared nurses. High fidelity human patient simulation is one method that has been used for many years to improve safety and quality in other fields, such as aviation, the military, and medicine. HFHPS is new to nursing education. Nurse researchers must continue to develop the evidence base of best practices in HFHPS. Nurse educators must employ evidence-based practices as they plan, implement, and evaluate HFHPS experiences provided to students.

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# Appendix A

## Support Letters from Study Sites

### Tulsa Community College

To Whom It May Concern:

Patricia Conejo has presented to the Associate Degree Nursing Program and simulation laboratory at Tulsa Community College, a proposal to conduct research evaluating faculty implementation of simulation and evaluation of student attitudes toward simulation. Tulsa Community College has approved this proposal and agreed to work with Patricia in the collection of data for this research project. If you have any further questions please do not hesitate to call me at (918) 595-8696.

Sincerely,

*Cheryl Feken Dixon RN MS*

Cheryl Feken Dixon RN MS
Assistant Professor of Nursing
Clinical Simulation Coordinator
Tulsa Community College
10300 E 81st Street
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St. Louis Community College

**St. Louis Community College**
Florissant Valley
Forest Park
Meramec

**Nursing Program**
3400 Pershall Road
St. Louis, MO 63135-1499
www.stlcc.edu/nursing

November 12, 2008

Patricia Conejo
18451 W. 248 Street
Paola, KS 66071

Dear Patricia,

This letter is to confirm the Nursing Program at St. Louis Community College supports participation of the simulation labs in your research study. We will require IRB approval after receiving your IRB approval. Please contact me if I may be of further assistance. Thank you.

Sincerely,

Karen Mayes

Karen Mayes, RN, MSN
Professor/Acting Director of Nursing Education
E-mail: kmayes@stlcc.edu
Florissant Valley Campus: (314) 513-4810
Forest Park Campus: (314) 644-9315
Meramec Campus: (314) 984-7757

St. Louis Community College at Florissant Valley
St. Louis Community College at Forest Park
St. Louis Community College at Meramec
South County Education and University Center
West County Education Center
William J. Harrison Northside Education Center
Center for Business, Industry & Labor
Joseph P. Cocoro Community College Center

Penn Valley Community College

Metropolitan Community College
Penn Valley

November 5, 2008

To Whom It May Concern:

Patricia Conejo has presented to the Associate Degree Nursing Program and the Human Patient Simulation Laboratory at The Metropolitan Community College-Penn Valley, Kansas City, MO, a proposal to conduct research evaluating faculty implementation of simulation and evaluation of student attitudes towards simulation. MCC-Penn Valley has approved this proposal and agreed to work with Patricia in the collection of data for this research project. If you have any further questions please do not hesitate to call me at 816-759-4474.

Sincerely,

Pam Anthony, RN MSN
Professional Nursing Program Coordinator
MCC-Penn Valley

3307 Southwest Trafficway | Kansas City, MO 64111 | T (816) 759-4000 | (816) 759-4161 | www.mcckc.edu

Johnson County Community College

JCCC

Johnson County Community College
12345 College Blvd.
Overland Park, Kansas 66210-1299
913-469-8500 www.jccc.edu

November 12, 2008

University of Kansas Medical Center
Institutional Review Board
Kansas City, Kansas

Dear IRB Committee,

I am writing to confirm a commitment to assist Patricia Conejo with her research proposal regarding simulation. Patricia will have access to faculty and students of the Johnson County Community College Nursing Program to complete surveys for data collection.

We are excited to be asked to participate with the research and assist in any capacity needed to implement.

Respectfully submitted,

Kathy Carver

Kathy Carver, RN MN
Johnson County Community College
Nursing Professor
12345 College Blvd
Overland Park, Kansas 66210
913-469-8500 x3895
kcarver@jccc.edu

40th Anniversary

Germanna Community College

| | | | |
|---|---|---|---|
| From: | Ann Woolford-Singh [AWoolford-Singh@germanna.edu] | Sent: | Thu 1/8/2009 12:47 PM |
| To: | Conejo, Patricia | | |
| Cc: | Patti Lisk; Jane Ingalls; Ann Woolford-Singh | | |
| Subject: | RE: IRB protocol and materials for proposed simulation study | | |
| Attachments: | | | |

Hi Tish,

I have reviewed the materials attached and see no problem with your using Germanna students for your study. Please work with Dr. Lisk and Dr. Ingalls to proceed. As is customary, sharing the results of your study with us would be appreciated.

I wish you all the best in your endeavors.

**Ann Woolford-Singh, PhD**
Vice President for Academic Affairs and Student Services
Germanna Community College
10000 Germanna Point Drive
Fredericksburg, VA 22408
Ph: 540-891-3033 fax: 540-710-2092
awoolford-singh@germanna.edu

**From:** Conejo, Patricia [mailto:Patricia.Conejo@avila.edu]
**Sent:** Thursday, December 11, 2008 9:13 PM
**To:** Ann Woolford-Singh
**Cc:** Patti Lisk; Jane Ingalls
**Subject:** IRB protocol and materials for proposed simulation study

Dr. Woolford-Singh,

Patti Lisk forwarded your email with the items you need from me in order for you to consider allowing Germanna's nursing students and faculty to participate in the study I am conducting for my dissertation.

I have attached copies of the instruments and consent forms as well as a summary of the protocol as it will be presented to the Human Subjects Committee at the University of Kansas Medical Center. A sample letter of support is also attached. The IRB requires that I include with the proposal a letter of support for the study from each site that will participate. If a letter of support is not possible at this time, an email that states support for the study pending IRB approval would be very helpful. When the study is approved by the university IRB, I will send a copy of the approval.

I plan to begin collecting data as soon as the study is approved by the IRB at the University of Kansas. It will probably take most of the month of January for that to happen, so data collection will likely begin in early February and extend to the end of the spring semester.

My goal is to enroll approximately 50 student participants and five faculty participants from Germanna in the study. I do not plan to contact any potential participants directly, but would send emails to Patti or her designee containing the explanatory letters for students and faculty that could then be forwarded to potential participants.

The aim of my study is to examine best practices in simulation. The literature in this area is growing, but still small compared to research in other disciplines. The associate degree population is particularly under represented in the literature, while associate degree nursing programs contribute over 60% of new registered nurse graduates.

I appreciate your willingness to look over the attached materials and consider the study. I hope Germanna will be able to participate.

Thank you!

Tish Conejo, RN, MSN, WHNP
Assistant Professor
Avila University School of Nursing

# Appendix B

## Letter to Teachers

Dear Colleague,

I am a doctoral student at the University of Kansas School of Nursing conducting research with Principal Investigator, Wanda Bonnel, RN, PhD, about how nurse educators prepare for and implement simulations and students' perceptions of the experience. Participants in this study will be nurse educators who have used high fidelity simulation as a teaching tool with nursing students and nursing students who have experienced high fidelity simulation.

High fidelity human patient simulations using computerized manikins re-create reality as closely as possible to prepare students to care for complex patients in the environment of the nursing laboratory. Nurse educators and nursing students are learning together about the best ways to use high fidelity simulation in nursing curricula. Nursing education strives to employ evidence-based teaching methods, but in this area very little research exists. The purpose of this study is to find out nursing educators' and nursing students' perceptions of the best ways to prepare for and implement high fidelity simulation experiences.

If you agree to participate in this study, you will indicate your consent by accessing a secure website from the following (insert URL here) to complete questionnaires that ask about your experiences with simulation. Your participation will take approximately 25 – 30 minutes.

Your participation in this study is voluntary and the choice not to participate or to quit at any time can be made without any penalty to you. There are no identified risks to you related to your participation in this study. You are unlikely to benefit from participating in this study, although you may benefit through improved understanding of how you prepare for and implement high fidelity simulations. It is hoped that information gained in this research study may be useful in understanding the perceptions of nurse educators and nursing students about how simulations are prepared for and implemented.

Your personal information will be kept confidential and your name will not be directly linked with any of the information from your questionnaires. Absolute confidentiality cannot be guaranteed, but to reduce this risk we will collect information through a secure website at the University of Kansas School of Nursing. In addition, any information stored in computer files will be password protected and all paper files will be kept in a locked filing cabinet. You may withdraw from this study at any time with no penalties. If the results of the study are published or presented in public, any information that might identify you will be removed.

If you have any questions you may address them to me at (913) 231-6521 or pconejo@kumc.edu. Please print a copy of this letter so that you may contact me should you have further questions about the study at a later time.

Sincerely,
Patricia Conejo, RN, MSN (913-231-6521)
Pconejo@kumc.edu

# Appendix C

## Letter to Students

Dear Nursing Student,

I am a doctoral student at the University of Kansas School of Nursing conducting research with Principal Investigator, Wanda Bonnel, RN, PhD, about how nurse educators prepare for and implement simulations and students' perceptions of the experience. Participants in this study will be nurse educators who have used high fidelity simulation as a teaching tool with nursing students and nursing students who have experienced high fidelity simulation.

High fidelity human patient simulations using computerized manikins re-create reality as closely as possible to prepare students to care for complex patients in the environment of the nursing laboratory. Nurse educators and nursing students are learning together about the best ways to use high fidelity simulation in nursing curricula. Nursing education strives to employ evidence-based teaching methods, but in this area very little research exists. The purpose of this study is to find out nursing educators' and nursing students' perceptions of the best ways to prepare for and implement high fidelity simulation experiences.

If you agree to participate in this study, you will indicate your consent by accessing a secure website from the following link (insert URL here) to complete questionnaires that ask about your experiences with simulation. Your participation will take 25 – 30 minutes.

Your participation in this study is voluntary and the choice not to participate or to quit at any time can be made without any penalty to you. There are no identified risks to you related to your participation in this study. You are unlikely to benefit from participating in this study, although you may benefit through improved understanding of how you prepare for and implement high fidelity simulations. It is hoped that information gained in this research study may be useful in understanding the perceptions of nurse educators and nursing students about how simulations are prepared for and implemented.

Your personal information will be kept confidential and your name will not be directly linked with any of the information from your questionnaires. Absolute confidentiality cannot be guaranteed, but to reduce this risk we will collect information through a secure website at the University of Kansas School of Nursing. In addition, any information stored in computer files will be password protected and all paper files will be kept in a locked filing cabinet. You may withdraw from this study at any time with no penalties. If the results of the study are published or presented in public, any information that might identify you will be removed.

This study is in no way associated with your coursework or grades, and none of the information you provide will be accessible to any of your nursing faculty.

If you have any questions you may address them to me at (913) 231-6521 or pconejo@kumc.edu. Please print a copy of this letter so that you may contact me should you have further questions about the study at a later time.

Sincerely,
Patricia Conejo, RN, MSN (913-231-6521)
Pconejo@kumc.edu

# Appendix D

## Teacher Demographic Questionnaire

The answers to the following questions will be used only to describe the sample of teachers participating in this research study.

Male _____ Female _____ Age _____

What is the name of the community college with which your nursing program is associated?

In which types of courses have you used simulations? (e.g. OB, Peds, etc.)

How many total years have you worked in undergraduate nursing education?

Number of years full-time_____ Number of years part-time/adjunct_____

What is your highest degree earned?

How long have you been using simulations as a teaching tool with nursing students?

# Appendix E

## Student Demographic Questionnaire

The answers to the following questions will be used only to describe the sample of students participating in this research study.

Male _____ Female _____ Age _____

What is the name of the community college with which your nursing program is associated?

In which semester of your nursing program are you currently enrolled? (e.g. 1st, 2nd , etc.)

In which types of courses have you used simulations? (e.g. OB, Peds, etc.)

How many high-fidelity human patient simulation experiences (with SimMan or a similar manikin) have you been involved in during your nursing education?

What is your comfort level with technology in educational settings? Please rate –

Low (1) Medium (2) High (3)

# Appendix F

## Educational Practices in Simulation Scale (Student Version) (EPSS-S)

**Educational Practices Questionnaire (Student Version)**

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

Use the following rating system when assessing the educational practices:

1 - Strongly Disagree with the statement
2 - Disagree with the statement
3 Undecided you neither agree or disagree with the statement
4 - Agree with the statement
5 - Strongly Agree with the statement
NA - Not Applicable; the statement does not pertain to the simulation activity performed.

Rate each item based upon how important that item is to you.

1 - Not Important
2 Somewhat Important
3 - Neutral
4 - Important
5 - Very Important

| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Active learning** | | | | | | | | | | | |
| 1. I had the opportunity during the simulation activity to discuss the ideas and concepts taught in the course with the teacher and other students. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 2. I actively participated in the debriefing session after the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 3. I had the opportunity to put more thought into my comments during the debriefing session. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 4. There were enough opportunities in the simulation to find out if I clearly understand the material. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 5. I learned from the comments made by the teacher before, during, or after the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 6. I received cues during the simulation in a timely manner. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 7. I had the chance to discuss the simulation objectives with my teacher. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 8. I had the opportunity to discuss ideas and concepts taught in the simulation with my instructor. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 9. The instructor was able to respond to the individual needs of learners during the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 10. Using simulation activities made my learning time more productive. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |

  Revised December 20, 2004

**Educational Practices Questionnaire (Student Version)**

Use the following rating system when assessing the educational practices:

1 - Strongly Disagree with the statement
2 - Disagree with the statement
3 - Undecided - you neither agree or disagree with the statement
4 - Agree with the statement
5 - Strongly Agree with the statement
NA - Not Applicable; the statement does not pertain to the simulation activity performed.

Rate each item based upon how important that item is to you.

1 - Not Important
2 - Somewhat Important
3 - Neutral
4 - Important
5 - Very Important

| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Collaboration** | | | | | | | | | | | |
| 11. I had the chance to work with my peers during the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 12. During the simulation, my peers and I had to work on the clinical situation together. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| **Diverse Ways of Learning :** | | | | | | | | | | | |
| 13. The simulation offered a variety of ways in which to learn the material. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 14. This simulation offered a variety ways of assessing my learning. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| **High Expectations** | | | | | | | | | | | |
| 15. The objectives for the simulation experience were clear and easy to understand. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 16. My instructor communicated the goals and expectations to accomplish during the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |



Revised December 22, 2004

# Appendix G

## Simulation Design Scale (Student Version) (SDS-S)

**Simulation Design Scale (Student Version)**

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

Use the following rating system when assessing the simulation design elements:

1 - Strongly Disagree with the statement
2 - Disagree with the statement
3 - Undecided - you neither agree or disagree with the statement
4 - Agree with the statement
5 - Strongly Agree with the statement
NA - Not Applicable; the statement does not pertain to the simulation activity performed.

Rate each item based upon how important that item is to you.

1 - Not Important
2 - Somewhat Important
3 - Neutral
4 - Important
5 - Very Important

| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Objectives and Information** | | | | | | | | | | | |
| 1. There was enough information provided at the begining of the simulation to provide direction and encouragement. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 2. I clearly understood the purpose and objectives of the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 3. The simulation provided enough information in a clear matter for me to problem-solve the situation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 4. There was enough information provided to me during the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 5. The cues were appropriate and geared to promote my understanding. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| **Support** | | | | | | | | | | | |
| 6. Support was offered in a timely manner. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 7. My need for help was recognized. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 8. I felt supported by the teacher's assistance during the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 9. I was supported in the learning process. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |

  Revised December 22, 2004

**Simulation Design Scale (Student Version)**

Use the following rating system when assessing the simulation design elements:

1 - Strongly Disagree with the statement
2 - Disagree with the statement
3 - Undecided - you neither agree or disagree with the statement
4 - Agree with the statement
5 - Strongly Agree with the statement
NA - Not Applicable; the statement does not pertain to the simulation activity performed.

Rate each item based upon how important that item is to you.

1 - Not Important
2 - Somewhat Important
3 - Neutral
4 - Important
5 - Very Important

| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Problem Solving** | | | | | | | | | | | |
| 10. Independent problem-solving was facilitated. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 11. I was encouraged to explore all possibilities of the simulation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 12. The simulation was designed for my specific level of knowledge and skills. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 13. The simulation allowed me the opportunity to prioritize nursing assessments and care. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 14. The simulation provided me an opportunity to goal set for my patient. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| **Feedback/Guided Reflection** | | | | | | | | | | | |
| 15. Feedback provided was constructive. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 16. Feedback was provided in a timely manner. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 17. The simulation allowed me to analyze my own behavior and actions. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 18. There was an opportunity after the simulation to obtain guidance/feedback from the teacher in order to build knowledge to another level. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| **Fidelity (Realism)** | | | | | | | | | | | |
| 19. The scenario resembled a real-life situation. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |
| 20. Real life factors, situations, and variables were built into the simulation scenario. | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 | ○ NA | ○ 1 | ○ 2 | ○ 3 | ○ 4 | ○ 5 |



Revised December 22, 2004

# Appendix H

## Student Satisfaction and Self-Confidence in Learning (LSS and LSCS)

Note: Please answer the items below in relation to whatever type of simulation in which you participated (e.g. Pediatrics, Obstetrics, Medical-Surgical, etc.)

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

 Revised December 22, 2004

# Appendix I

## Student Open-ended Questionnaire

1) How were you expected to prepare for the simulation?
2) What information is important for your nursing faculty to provide before you begin a simulation experience?
3) What did you like best about the simulation?
4) What did you like least about the simulation?

Appendix J

**Educational Practices Questionnaire (Teacher Version) (EPSS-T)**

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

| Use the following rating system when assessing the educational practices:<br>1 – Strongly Disagree with the statement<br>2 – Disagree with the statement<br>3 – Undecided – you neither agree or disagree with the statement<br>4 – Agree with the statement<br>5 – Strongly Agree with the statement<br>NA – Not Applicable; the statement does not pertain to the simulation activity performed. | Rate each item based on how important that item is to you.<br>1 – Not Important<br>2 – Somewhat Important<br>3 – Neutral<br>4 – Important<br>5 – Very Important |
|---|---|

| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Active Learning** | | | | | | | | | | | |
| 1. Opportunities are provided during the simulation activity to discuss the ideas and concepts taught in the course with the teacher and other students. | | | | | | | | | | | |
| 2. Students and teacher(s) actively participated in the debriefing session after the simulation. | | | | | | | | | | | |
| 3. Students have the opportunity to put more thought into their comments during the debriefing session. | | | | | | | | | | | |
| 4. Students have enough opportunities during the simulation to find out if they clearly understand the material. | | | | | | | | | | | |
| 5. I (the teacher) have the opportunity during the simulation to find out if students clearly understand the material. | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 6. Students appear to have learned from the comments made by me (the teacher) before, during, or after the simulation. | | | | | | | | | | | |
| 7. I (the teacher) provided cues to the learners during the simulation in a timely manner. | | | | | | | | | | | |
| 8. Students have the opportunity to discuss the simulation objectives with me (the teacher). | | | | | | | | | | | |
| 9. Students have the opportunity to discuss ideas and concepts taught in the simulation with me (the teacher). | | | | | | | | | | | |
| 10. I (the teacher) was able to respond to the individual needs of learners during the simulation. | | | | | | | | | | | |
| 11. Using simulation activities was a productive use of the learners' time. | | | | | | | | | | | |
| **Collaboration** | | | | | | | | | | | |
| 12. Learners have the chance to work with their peers during the simulation. | | | | | | | | | | | |
| 13. During the simulation, learners and their peers had to work on the clinical simulation together. | | | | | | | | | | | |
| **Diverse Ways of Learning** | | | | | | | | | | | |
| 14. The simulation offered a variety of ways in which to learn the material. | | | | | | | | | | | |
| 15. This simulation offered a variety of ways of assessing learning. | | | | | | | | | | | |
| **High Expectations** | | | | | | | | | | | |
| 16. The objectives of the simulation experience were clear and easy to understand. | | | | | | | | | | | |
| 17. I (the teacher) communicated the goals and expectations to accomplish during the simulation. | | | | | | | | | | | |

Appendix K

**Simulation Design Scale (Teacher Version) (SDS-T)**

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

| Use the following rating system when assessing the simulation design elements:<br>1 – Strongly Disagree with the statement<br>2 – Disagree with the statement<br>3 – Undecided – you neither agree or disagree with the statement<br>4 – Agree with the statement<br>5 – Strongly Agree with the statement<br>NA – Not Applicable; the statement does not pertain to the simulation activity performed. | | | | | | | Rate each item based on how important that item is to you.<br>1 – Not Important<br>2 – Somewhat Important<br>3 – Neutral<br>4 – Important<br>5 – Very Important | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Item | 1 | 2 | 3 | 4 | 5 | NA | 1 | 2 | 3 | 4 | 5 |
| **Objectives and Information** | | | | | | | | | | | |
| 1. I (the teacher) gave enough information at the beginning of the simulation to provide direction and encouragement. | | | | | | | | | | | |
| 2. Learners clearly understood the purpose and objectives of the simulation. | | | | | | | | | | | |
| 3. The simulation provided enough information in a clear manner for learners to problem-solve the situation. | | | | | | | | | | | |
| 4. I (the teacher) provided enough information to learners during the simulation. | | | | | | | | | | | |
| 5. I (the teacher) provided cues that were appropriate | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| and geared to promote learners' understanding. | | | | | | | | | | | |
| **Support** | | | | | | | | | | | |
| 6. I (the teacher) offered support to the learners in a timely manner. | | | | | | | | | | | |
| 7. I (the teacher) recognized when learners needed help. | | | | | | | | | | | |
| 8. My (the teacher) assistance supported the learners during the simulation. | | | | | | | | | | | |
| 9. Overall, I (the teacher) supported the learning process for learners. | | | | | | | | | | | |
| **Problem Solving** | | | | | | | | | | | |
| 10. Independent problem-solving was facilitated for learners. | | | | | | | | | | | |
| 11. Learners were encouraged to explore all possibilities of the simulation. | | | | | | | | | | | |
| 12. The simulation was designed for the learners' specific level of knowledge and skills. | | | | | | | | | | | |
| 13. The simulation allowed learners the opportunity the prioritize nursing assessments and care. | | | | | | | | | | | |
| 14. The simulation allowed learners the opportunity to set goals for the patient. | | | | | | | | | | | |
| **Feedback/Guided Reflection** | | | | | | | | | | | |
| 15. I (the teacher) provided constructive feedback. | | | | | | | | | | | |
| 16. I (the teacher) provided feedback in a timely manner. | | | | | | | | | | | |
| 17. The simulation allowed learners to analyze their behavior and actions. | | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 18. There was an opportunity after the simulation for learners to obtain guidance/feedback from me (the teacher) in order to build knowledge to another level. | | | | | | | | | | | |
| **Fidelity (Realism)** | | | | | | | | | | | |
| 19. The scenario resembled a real-life situation. | | | | | | | | | | | |
| 20. Real life factors, situations, and variables were built into the simulation scenario. | | | | | | | | | | | |

# Appendix L

## Teacher Open-ended Questionnaire

These questions are about high-fidelity human patient simulations that use computerized manikins. Your responses to these questions are very important. Please answer them as fully as possible.

1. How do you prepare for a simulation?
2. What information is it important for you to provide to students before they begin a simulation experience?
3. What steps or processes do you think about when you implement a simulation with students?
4. What did you use to help learn or develop your process for implementing a simulation?
5. How do you orient and prepare students for the simulation experience?
6. What are the reasons you use simulation with students?
7. What do you think are the advantages to using simulation as a teaching tool?
8. What do you think are the drawbacks to using simulation as a teaching tool?

# Appendix M

## Teacher Themes for Preparation and Implementation of High Fidelity Human Patient Simulation

| Preparation Themes | Implementation Themes |
|---|---|
| 1) Learning Environment Readiness – Preparation of manikins and other equipment for the simulation. | 1) Ensuring Fidelity – Replicating real life situations in the simulation. |
| 2) Readiness to Facilitate Learning - Use of learning objectives and awareness of student characteristics. | 2) Self-Development - Learning to implement simulations through observation, self-directed study of simulation, and practice. |
| 3) Student Readiness – Orientation to the simulation environment, provision of clear objectives and adequate patient information. | 3) Developing Students' Thinking Skills – Developing thinking skills by incorporating active learning and problem-solving into the simulation. |

# Appendix N

## Comparison of Student Themes and Subthemes to SDS-S and EPSS-S Components

| Themes | Related SDS-S Element | Related EPSS-S Element |
|---|---|---|
| Preparation – | | |
| Gathering Information | Problem-solving | Active Learning |
| Analyzing Information | | High Expectations |
| Demonstrating Understanding | | |
| Information Needed from | | |
| Faculty - | | |
| Patient Information | Support | High Expectations |
| Expectations | Objectives | |
| Orientation to the Simulation Experience | Fidelity | |
| Positive HFHPS | | |
| Characteristics - | | |
| Learning from Mistakes | Feedback/Reflection | Collaboration |
| Preparation for Real Life | Problem-solving | Active Learning |
| Safe Environment | | Diverse Ways of Learning |
| Negative HFHPS | | |
| Characteristics - | | |
| Surveillance | Support | High Expectations |
| Fidelity Limitations | Objectives | Active Learning |
| Teaching/Learning Practices | Fidelity | |
| Subthemes- | Feedback/Reflection | |

| |
|---|
| Feeling Lost |
| Group Size |
| Time for Learning |
| Negative Behaviors |

# Appendix O

## Checklist for Orienting Students to the High Fidelity Human Patient Simulation Experience

1) Simulation Technology
    a. Features of the simulator manikins (physiologic responses, voice responses)
    b. Limitations of the simulator manikins (mechanical sounds, special handling required)
    c. Control room activities during simulation
    d. Use of videotaping
2) Simulation Process
    a. Pre-briefing, if applicable
    b. Length of simulation scenario
    c. Debriefing
3) Resources (location and how to access)
    a. Supplies and equipment
    b. Human resources (“physician, “pharmacy”)
4) Expectations
    a. Description and assignment of roles during simulation
    b. Nursing skills to be performed
    c. Knowledge needed
    d. Pre-simulation assignments

5) Simulated Patient Information

    a. History

    b. Sources of information

Appendix P

Relationship of Age and Age Group to Comfort with Technology