EVALUATION OF SIMULATED CLINICAL EXPERIENCES BY ASSOCIATE DEGREE NURSING STUDENTS AND FACULTY

A RESEARCH PAPER

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BY

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ABSTRACT

RESEARCH PAPER: Evaluation of Simulated Clinical Experiences by Associate Degree Nursing Students and Faculty

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Hands-on clinical experience for nursing students is time-limited and opportunity to observe and intervene in clinical crises is not always available. The emergence of increasingly sophisticated simulation equipment enables the student to practice both new skills and "virtual" crisis intervention in a non-threatening but realistic manner. Feedback from students has not always been definitive and more investigation must be carried out to determine if simulations from students predict confidence and competence in assessment and psychomotor skills, critical thinking, and crisis intervention. This study uses Feingold et al.'s (2004) study as a prototype, with Knowles's Theory of Andragogy as the theoretical framework. The sample will be two groups of 25 Associate Degree Nursing students and two instructors from Northwest State Community College in Archbold, Ohio. The groups will be used during two consecutive semesters of one academic year. Written permission will be obtained from all participating institutions and parties. Surveys using a 20 item tool scored on a four-point Likert scale and a 17 item tool with a four point Likert scale will be used for evaluation purposes. Survey responses will be analyzed using descriptive statistics. Findings will inform nursing faculty regarding the benefits of using high fidelity human patient simulators in nursing education.
Chapter 1

Introduction

Introduction

The healthcare environment is in a constant state of flux, and instructors and students involved in nursing education today face challenges that were nonexistent in past generations. Many parts of North America and the world exhibit a nursing personnel shortage. Addressing the nursing personnel shortage issue is more complicated than just admitting more students to nursing school. Patient hospital stays tend to be very short and inpatients tend to be very sick. Many hospitals have fewer inpatient beds than in previous years. Schools of nursing are competing for clinical facilities for their students, and students must be prepared to care for the sickest of the sick. A shortage of nursing faculty also exists and employers are not able to offer prolonged orientation programs to enable new graduates to function safely and efficiently as part of the healthcare team (Jeffries, 2005). Clinical simulation, combined with clinical experience and other teaching methods, is one instructional method being integrated into many nursing programs as a vehicle to deliver real-life learning skills to nursing students.

Jeffries (2005) validated that nurse managers and staff development educators considered many new graduates nurses and students did not have the necessary critical thinking skills to function in the increasingly complex hospital environment. She proposed that providing patient simulations to students and new graduates was an
efficient method of teaching content and critical thinking skills safely and without the possibility of causing harm to an actual patient. She investigated the instructional practices of simulation which contributed to positive learning outcomes, the role of the faculty in facilitating clinical experiences, and the simulation design elements which contributed to positive learning outcomes. Jeffries defined simulation as being "activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through techniques such as role playing and the use of devices such as interactive videos or mannequins" (Jeffries, 2005, p. 97).

**Background and Significance**

Simulation has been used in nursing for more than a century; one of the first uses of low technology simulation was the Chase mannequin. In 1910, Martha Jenks Chase, who had started the Chase doll factory, was asked to create an adult-sized mannequin with the same characteristics of realism as her play dolls for the Hartford (CT) Hospital Training School for nurses. This doll was 5'4" and had stitched hip joints, knees, elbows, and shoulders, and was an improvement over the straw-filled dummies available before her genesis. The doll was informally known as "Mrs. Chase" by several generations of nursing students who used her for practice of basic nursing skills. In 1913, the Chase Company began producing "Sanitary Dolls," in infant and a range of children's sizes. These dolls were weighted to simulate actual body mass and had aural and nasal openings. Schools of nursing used them for the teaching and practice of pediatric nursing skills with each doll commonly called "Baby Chase." Throughout the years, the Chase
doll was modified and upgraded as new construction materials became available and nursing procedures became more complex (Herrmann, 2008).

Simulation mannequins range from low to high technology and from low to high fidelity. According to Doyle (2011, para.4), "Fidelity of simulation is the accuracy of a representation when compared to the real world or the degree to which a representation is similar, in a measurable or perceivable manner, to a real-world object, feature, or condition. The term 'fidelity' also refers to complexity and ability to recreate reality." The three aspects of fidelity are comprised of equipment fidelity, environmental fidelity, and psychological fidelity. In other words, how real and life-like is the simulation? Low-technology and low fidelity uses of simulation in nursing, besides the use of the Chase mannequin, have included the use of oranges to practice intramuscular injections and later, injection pads with a skin-like plastic surface and a removable sponge underneath to absorb the saline or sterile water used in practice. Hot dogs have been used to practice intradermal injections, and many former nursing students have memories of practicing baths and injections on one another. Another form of low technology simulation which is still used in some nursing schools today is that of role playing. A scenario is given to one or more students to act out with a specific desired outcome. Basic written case studies are also a form of low fidelity simulation (Como, Kress, & Lewental, 2009).

Medium fidelity simulation is more realistic than low fidelity. However, medium fidelity simulation does not have automatic cues such as pupillary constriction from an administered medication or the rise of the chest with inspiration (Como et al., 2009). Most responses are created by the facilitator-operator with medium-fidelity simulators, so the interaction with the learner is limited (Doyle, 2011).
The year 1994 marked the emergence of high fidelity patient simulators (HFPS) into health care. These were model driven simulators and were programmed with complex mathematical models of human physiology and pharmacology. These simulators were highly sophisticated and able to simulate a patient's "response" in real time with reactions to nursing interventions without the intervention of the facilitator. For example, a properly equipped mannequin was able to be programmed to "suffer" from a hypoxic episode and respond to a student's application and titration of oxygen. Changes in oxygen levels could be calculated with a new PAO2, PaO2, PACO2, PaCO2, and SPO2 resulting. Changes in heart and respiratory rates also correlated. Since 1994, a plethora of patient simulators have become commercially available to schools of nursing and other health care institutions. Some are high fidelity and model driven and others are medium fidelity and instructor driven (Doyle, 2011).

Historically, simulations have been used to teach psychomotor skills to nursing students. Now, because of changes in the healthcare environment and the advent of high fidelity simulators, it might be possible and even positive for learning to be achieved with the use of high fidelity simulators in carefully designed simulation scenarios. Because the use of high fidelity simulators such as "SimMan" is relatively new to nursing education, the optimal use of high fidelity simulations is still in a state of development and refinement. Research studies, such as the one by Feingold et al. (2004), provide valuable insight into the most beneficial uses of simulation as perceived by nursing faculty and students. Insight into perceived barriers to the optimal use of simulation can also be gained so those barriers can be addressed and minimized.
Problem Statement

Investigation of students' and faculty members' perceptions of high fidelity simulation-realism, learning values, and transferability to clinical experiences is needed for future direction and justification of the continued use of high fidelity technology.

Purpose

The purpose of this descriptive comparison study is to elucidate the perceptions of undergraduate nursing students and faculty members about the experience of using SimMan, the computerized high fidelity patient mannequin for teaching and assessment during simulated clinical scenarios. This is a replication of Feingold, Calaluce, and Kallen's (2004) study.

Research Questions

1. What are the perceptions of students and faculty regarding the realism of the simulated patient scenario?
2. What are the perceptions of students and faculty regarding students' ability to transfer knowledge from the simulated clinical scenarios to real clinical experiences?
3. What are the perceptions of students and faculty regarding the value of the simulated learning experience?

Theoretical Model

Malcolm Knowles' Theory of Andragogy provides the theoretical model of adult learning reflected in the conduction of clinical simulations. Knowles believed that when adults enter education, it is with a different time frame than children, which produces a
difference in how adults view learning. Children have a subject-centered frame of mind because most of their learning has a postponed application. Adults, however, have a problem-centered frame of mind. Education is to assist them in dealing with currently faced life problems. Their perspective toward learning is one of immediacy of application (Knowles, 1970).

This difference in orientation to learning has led to the flow of several implications for the technology of Andragogy. Instead of focusing on a logical development of subject matter, the adult educator should be primarily attuned to the learning needs and concerns of the students being served, and be able to develop learning experiences to address these concerns. Andragogical teachers need to be program builders and person-centered. They do not teach subject matter but rather function as facilitators of learning. Andragogy has also impacted the organization of the "curriculum." Since adult learners are problem-centered in their orientation to learning, problem areas, not subjects, are the appropriate organizing milieu for learning sequences. This means also that the optimal starting points of the learning experience are the problems and concerns on the minds of the learners. The instructor may then add other problems that are expected to be dealt with into the mix (Knowles, 1970, p. 48-49).

Knowles believed that "the critical element in any adult-education program is . . . what happens when a teacher comes face-to-face with a group of learners." He goes on to make some assumptions on which his Andragogical approach to teaching and learning is premised. The first of these assumptions is simply that adults can learn. Edward Thorndike reported in 1927 that his findings showed that the ability to learn declined just very slowly and very slightly after age 20. Research to date in 1970 clearly indicated that
the ability to learn is essentially unimpaired throughout the lifespan, and if problems in learning performance manifest, the cause may be one of several factors. One such factor is that adults who have not been involved in systematic education for some time may lack confidence, underestimate their ability to learn, and not fully apply themselves to learning. Also, adults may have to adjust themselves to methods of teaching that have changed since they were in school, physiological changes such as a decrease in visual acuity may pose barriers for which compensation must be made, and external sanctions for learning such as grades are less important to adults than internal motivation (Knowles, 1970, p. 50-51)

Knowles' second assumption about learning and teaching is that learning is an internal process. Though not completely understood by researchers, learning is controlled by the learner and engages his intellectual, emotional, and physiological functions. Psychologically, learning is a process of goal-striving and need-meeting on the part of the learner; an individual is motivated to learn in proportion to his need to learn and has a personal goal that can be achieved by learning. Knowles believed that the central dynamic of the learning process was the experience of the learner with experience defined as being the interaction between the individual and his environment. The management of the two key variables of environment and interaction comprises the essence of the art of teaching. The creation of a rich learning environment for students and to guide their interaction with it so learning can be maximized is the critical function of the teacher (Knowles, 1970, p. 50-51).

There are superior conditions of learning and principles of teaching is Knowles' third assumption about learning and teaching. He stated that a growing body of
knowledge was making it increasingly clear that certain conditions were more conducive to learning than others. Identified practices in the teaching-learning transaction seem to produce these superior conditions. Included in the conditions of learning is that the need to learn is felt by the learner. The learning environment should be characterized by physical comfort, mutual trust, respect, and helpfulness, acceptance, and freedom of expression. The learner must perceive the goals of the learning experience to be his goals; he shares responsibility for the planning and operation of the learning process and participates actively in it. Also, the learning process needs to make use of the experience of the learner and the learner should have a sense of progress toward his goals (Knowles, 1970, p. 52-53).

Knowles advocated numerous responsibilities for teachers in his Principles of Teaching. The first principle was that the teacher exposes the student to new possibilities for self-fulfillment. He also believed that the teacher should help the adult student identify life problems he was experiencing because of gaps in personal equipment. The teacher was expected to provide comfortable physical conditions that were conducive to interaction, respectfully accept each student as a person of worth, build relationships of mutual trust, expose his own feelings and contribute his own resources. Other principles of teaching included assisting students in formulating learning objectives, sharing thinking about available options in the designing of learning experiences, and helping students organize themselves. The teacher is also expected to utilize techniques such as discussion, role playing, and case studies to help students exploit their own experiences as resources for learning, and titrate the presentation of his own resources to the levels of particular students. In helping students apply new learning to experiences, the teacher
makes learning more meaningful. The teacher also involves students in the development of methods for measuring progress toward learning objectives that are mutually acceptable, and helps students with self-evaluation (Knowles, 1970, p. 52-53).

Clinical simulation is consistent with Knowles' Theory of Andragogy because it is interactive, builds on prior knowledge, and addresses real clinical problems (Feingold et al., 2004). Also, the role of the faculty member is that of a facilitator in assisting the student to see gaps in his knowledge and become self-directed in learning.

**Definition of Terms**

Applying Knowles' (1970) Theory of Andragogy as the framework, this study proposes that high fidelity clinical simulation involving communication, psychomotor performance, assessment, and clinical decision making would be an adequate test of the clinical competence of students and also would provide a learning experience with high transferability to actual clinical encounters.

*High Fidelity Simulator: Conceptual*

A simulator is a device used in the laboratory for the purpose of reproducing, under test conditions, the phenomena or events likely to occur in actual performance. Fidelity refers to the degree of realism. A high fidelity simulator is a simulation device, such as a mannequin, with very realistic function and appearance.

*High Fidelity Simulator: Operational*

For this study, "SimMan," a complete, model driven human mannequin" (Doyle, 2011, para. 5), was the high fidelity simulator used. "SimMan" can be programmed to vocalize and physically respond to stimulation and intervention.
Simulated Patient Scenario: Conceptual

Scenario can be defined as being an imagined or projected sequence of events, especially any of several plans or possibilities. In a simulated patient scenario, that imagined or projected sequence of events would feature a clinical event or series of events using a human patient simulator.

Simulated Patient Scenario: Operational

In the study by Feingold et al., a simulated patient scenario featured a projected series of events using the high fidelity human patient simulator, "SimMan," in the critical care area of the school's Patient Care Learning Center. Vital signs are displayed along with some laboratory data on the computerized patient's monitor. SimMan also has pulses, breath and bowel sounds, and a blood pressure and is capable of vocalizing and responding to nursing interventions as faculty members program a trend. Each student was observed and scored, based on a checklist of critical behaviors and a indicators of clinical decision making (Feingold et al., 2004).

Faculty Perception of Simulation: Operational

In this study, a 17-item survey using a four-point Likert format was used to elicit faculty perceptions of simulation. Included with this tool were items related to the need for faculty support and training related to the use of the new technology (Feingold et al., 2004).

Student Perception of Simulation: Operational

A 20-item survey using a four-point Likert scale was used to gauge student perceptions of their simulated learning experiences. Survey items related to the value of
the experience, the realism of the simulations, and the transferability of skills learned to the real clinical world (Feingold et al., 2004).

Limitations

A limitation of this study is the exclusion of the comparison of grades on simulated and actual experiences. Initially, the plan for this study included a qualitative interview with some students with analysis of the clinical grades of those students. However, students did not volunteer to participate in that part of the study. The researchers suggested that perhaps interviews with students could elicit the students' own descriptions of what interaction with SimMan was like so conditions under which this technology works best could be clarified.

Assumptions

The following assumptions were made in this study and replicated the Feingold et al. (2004) study.

- Active participation in realistic clinical simulations may promote critical thinking skills in nursing students (Feingold et al., 2004).
- Simulation can be used to demonstrate competence outcomes in nursing programs.
- Clinical simulation provides opportunities for skill acquisition and decision making in a risk-free environment.
- The transfer of learning is facilitated when clinical simulations are as realistic as possible.
- Clinical simulation involving assessment, clinical decision making, communication, and psychomotor performance is an adequate test of students'
clinical competence and provides a learning experience with high transferability to "real life."

- Nursing students and faculty members will provide honest answers to the Likert-format evaluation questions.

**Summary**

The health care environment is constantly changing. Hospitals have fewer acute-care beds, the patients are more acutely ill, and hospital stays are shorter than in previous decades. Schools of nursing must compete for available clinical facilities for their students and many employers state that new graduate nurses are not equipped to function in the "real world" of health care. These employers are not able to provide the lengthy orientation programs needed to make these new graduates "functional."

The purpose of this study is to determine and evaluate the perceptions of nursing students and faculty members regarding the realism, transferability of knowledge, and overall value of clinical simulation scenarios using the high fidelity "SimMan" simulator for undergraduate associate degree nursing students enrolled in the Advanced Acute Care of the Adult course. Replicating Feingold, Calaluce, and Kallen’s (2004) study, the framework utilized in this study is Knowles (1970) Theory of Andragogy. According to Knowles, adult learning (andragogy) is much more pragmatic and problem-oriented than the learning of children (pedagogy). Active teaching-learning transactions with the learners being able to use their prior knowledge and experience and have a sense of progress toward their goals are effective for the adult learner. The role of the teacher is not so much that of the purveyor of facts and knowledge as it is one of being the facilitator of learning and discovery. Clinical simulation is consistent with Knowles' Theory of
Andragogy because it relates to real clinical problems, is interactive, and builds on prior knowledge (Feingold et al., 2004). Therefore, this study proposes that clinical simulations using the high fidelity "SimMan" simulator can be effectively used to deliver "real-life" learning skills to nursing students.
Chapter II

Review of Literature

Introduction

The literature review contains selected articles that explain or reveal undergraduate nursing students’ and faculty members’ perceptions about the experience of using clinical simulations. The first section of the literature review consists of the theoretical framework for the study. The second section explores faculty perceptions of the use of simulations in the nursing curriculum. Section three focuses on student perceptions of simulation use in education. A final section reviews research studies which have evaluated both faculty and student perceptions of the use of clinical simulations in nursing. A summary concludes the chapter.

Theoretical Framework

As a replication of the descriptive study by Feingold, Calaluze, and Kallen (2004), this study used Knowles' Andragogy as its theoretical framework. Malcolm Knowles (1913-1997) focused on the notion of adult informal education and was especially attuned to the "friendly and informal climate," flexibility of process, use of experience, commitment, and enthusiasm of participants in many adult learning situations. Knowles never defined informal adult education but used the term to refer to the use of informal programs and sometimes to the learning gained from club life or association. According to this way of thinking, an organized or formal course was typically the better instrument for learning new or intensive material, but a "club"
situation provided the best opportunity for practicing things learned and refining skills. Knowles suggested that informal learning programs are likely to use forum and group processes which are more flexible than organized classes (Smith, 2002).

The assumptions of Andragogy represented values underlying adult educational theory. The first assumption is the adult needs to know the rationale for the action prior to the execution of the action. A second assumption relates to the self-concept of the adult learner. Adults need to be responsible for their decisions and to be self-directed. The third assumption is that adult learners have a background of experiences that represent a rich resource for learning. However, these experiences may be prejudicial and lend bias to the learning process. The fourth assumption is that adults have a readiness to learn those things that will benefit them in coping with life situations. The fifth assumption is that adults are motivated to learn in direct proportion to their perceptions that the learning will help them perform tasks particular to their life situations. (Atherton, 2011, p.1).

Knowles believed that adults learned differently from children and this was the premise used for his distinctive field of inquiry. Knowles' Andragogy is an attempt to build a comprehensive theory of adult learning that is anchored in the characteristics of adult learners (Smith, 2002, p. 7-8).

Faculty Perception of Simulation Use in Education

In their review of the literature, Jansen, Johnson, Larson, Berry, and Brenner (2009) discovered that many nursing programs had incorporated manikin-based simulation to provide clinical experiences with difficult-to-access and culturally-diverse populations. Manikins were also being used to teach critical thinking, interdisciplinary teamwork, and to enable students to practice technical skills in a safe environment.
Despite the growing popularity of high-fidelity simulators, the researchers identified that some educators were reluctant to incorporate manikin-based simulations into their teaching. Few research studies had been performed to systematically investigate what nursing faculty perceived as obstacles to the implementation of manikin-based simulations. The purpose of this research study was to identify obstacles to utilizing manikin-based simulations as perceived by 25 nursing faculty members from associate degree and baccalaureate nursing programs (Jansen et al., 2009).

The organizing framework for the study was the teacher factors element of the Jeffries Nursing Education Simulation Framework. The framework consisted of five elements: (a) teacher factors; (b) student factors; (c) educational practices; (d) simulation design characteristics; and (e) expected student outcomes. Included in teacher factors were comfort with using manikin-based simulations and clinical and teaching expertise. Student factors included year in the nursing program, age, and previous healthcare experience. The educational practice element included teaching strategies focused on active learning, collaboration between faculty and students, high expectations for students, and a variety of student learning styles. Included in simulation design characteristics were learning objectives, degree of realism, appropriate level of complexity, support by the simulation facilitator, and debriefing. Gains in critical thinking ability and understanding and growing comfort with skills were all categorized by expected student outcomes (Jansen et al., 2009).

Simulations have been defined as "activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision making, and critical thinking through techniques such as role playing and the use of devices such as
interactive videos or manikins." The researchers noted from their review of the literature that low, moderate, and high fidelity manikins were available for purchase, and a current trend across the nation was for the purchase of moderate- and high-fidelity models. However, although it had been noted in the literature that simulators were being purchased by nursing schools; frequently faculty were not prepared to use them in their courses (Jansen et al., 2009, p. e10).

This study employed a qualitative, descriptive design with an empiric analytical technique for content analysis. The sample was composed of 25 self-selected faculty from five Wisconsin Technical College System and five University of Wisconsin System nursing programs who were all participants in the Wisconsin Technology Enhanced Collaborative Nursing Education (WITECNA) project. Strengthening technology-enhanced teaching strategies, including manikin-based simulation was the focus of the project. Nineteen of the faculty were from baccalaureate programs and six were from associate degree programs; eight had doctorate degrees, 16 were masters-prepared, and one had a baccalaureate degree. All participants were women and 92% expressed interest in incorporating simulation into their courses; two (8%) were not interested. Some level of manikin-based simulation (high fidelity, 44%; moderate fidelity, 32%; low fidelity, 52%) was being used by 72% of the faculty in their courses. Twenty-eight per cent of the participants were not using manikin-based simulation. Sixty-four percent felt comfortable with manikin-based simulations and 48% were comfortable with the creation of simulation scenarios (Jansen et al., 2009).

Jansen et al. (2009) developed an online survey which included eight closed-ended descriptive items and one open-ended question to be answered by participating
faculty. Limited demographic information and utilization of and interest in manikin-based simulations were addressed by the closed-ended questions. Participants responded to an open-ended question regarding the biggest obstacle(s) to using simulation in teaching their course(s); the online survey was restricted to only study participants. Survey information was used to help research team members in preparing activities targeting the learning needs of the faculty in regards to manikin-based simulations. The appropriate institutional review board issued letters of informed consent which were signed by the 25 study participants (Jansen et al., 2009).

After a computer printout listing participant responses was created, content analysis was performed. Content analysis steps were carried out by segmenting each response into individual thoughts pertaining to a particular obstacle. The process was repeated by a second researcher. Interrater reliability in determining content of individual thought was 92.7%, exceeding the acceptable level of 80%. The research team independently reviewed all responses and created categories for the responses based on their similarities. Comparison and revision was carried out until consensus was reached among research group members. The seven resulting categories of obstacles were: time, training, not applicable/attitude, lack of space and equipment / problems scheduling lab, staffing, funding, and engaging students not involved in simulations while classmates were performing simulations. Definitions describing each category were developed by the team. Finally, the individual responses by study participants were all integrated into one of the seven categories by the primary and secondary researchers with interrater reliability of 89.5%. When primary and secondary investigators disagreed regarding a
category, the entire research team weighed in until the issue was resolved (Jansen et al., 2009).

Results of nursing faculty perceptions of obstacles to using simulations in their courses were all integrated into one of the seven categories. The categories will be described in order of frequency, beginning with the one with the greatest number of responses and ending with the one with the least number. Included in this discussion will be the solutions proposed by the researchers (Jansen et al., 2009).

Time, referring to the amount of a day which could be dedicated to simulations, was the most cited obstacle with nine responses. Responders listed finding time to develop and perfect scenarios, shifting time from other activities, and time necessary to "figure it all out." Possible solutions included sharing scenarios with other faculty members, networking, involving community nurses and retired faculty, graduate assistants, and senior nursing students, and using simulation for some clinical assignments (Jansen et al., 2009).

Training was the second most cited obstacle with eight responses. Responses referred to instruction and educational opportunities to learn the technical aspects of operating and utilizing manikin-based simulations as well as training for the creation of scenarios. Participants also mentioned the increased "learning curve" associated in working with moderate and high fidelity simulators. Solutions for this obstacle were to create superusers by "training the trainer," enabling faculty to apply content immediately after training before the content could be forgotten, beginning with simple simulations, and scheduling faculty retreats for training with incentives to attend (Jansen et al., 2009).
Six faculty participants indicated that manikin-based simulation was in no way appropriate for integration into their courses. One faculty member who taught research, theory, and complementary therapies, saw "no fit" between simulation and these courses. Another participant wrote that "faculty peers" were the biggest obstacles, and a third felt that a barrier was "buy-in" by faculty and administration. Proposed solutions for this obstacle category included educating and exposing faculty to the possibilities in education for simulations with manikins, one-to-one meeting with faculty members and the simulation facilitator, the creation of superusers, recording scenarios for incorporation into online courses for students to critique, and making sure a simulation person was on the curriculum committee (Jansen et al., 2009).

Lack of space and problems with scheduling the lab elicited five responses from study participants. "Scheduling lab time" and "deficiencies of space and equipment" were specifically cited. Some of the participants indicated the lab was not large enough to accommodate the number of students that would be in a class. The use of innovative, flexible scheduling was one proposed solution to this barrier. Other possibilities included the sharing of faculty, scenarios, equipment, and space with other departments or institutions, enabling upper- and lower- level students to practice together in the lab and to rotate students through different stations (Jansen et al., 2009).

Funding, meaning insufficient monies to purchase and maintain manikins, the simulation laboratory, and staff, and associated expenses, was the next most cited obstacle with four responses from faculty members. Recommended solutions were to seek funds from foundations, donors, granting agencies, and alumni for financial support, and to partner with community agencies, corporations, and institutions. Another
recommendation was to recoup expenses with user fees, rent out services and equipment, and engage in "creative frugality" (Jansen et al., 2009).

Tying with funding was staffing, also with four responses. Pertinent to staffing was having insufficient trained personnel to facilitate simulations and to supervise and maintain the simulation lab. There was a perceived need for additional human resources to supervise, operate equipment, and manage the lab. Solutions for this barrier included hiring work-study undergraduate and graduate students, enabling upper- and lower-level students to practice together in the lab, enlisting drama students to play roles, enlisting retired or community nurses to help, utilizing regional simulation centers that are already staffed, and rotating students through different work station activities so all were engaged (Jansen et al., 2009).

Category seven was engaging all students while only a few are actively involved in simulation. Two participating faculty responded in this category. Because class sizes were large, roles and activities for the student body needed to be planned to make manikin-based simulation doable and beneficial to students' learning. The salient concern expressed was what to do with the students in the classroom when just a few were involved in the simulation activity. Recommended solutions to this perceived obstacle were to engage students as observers when necessary, recording scenarios for students to critique in online courses, and rotating students through different stations or activities so that all students were occupied and engaged in learning (Jansen et al., 2009).

Interest was expressed in incorporating manikin-based simulation learning into their courses by most participants in the WITECNA project. Most were already using simulation to some degree so were aware of potential barriers and were able to identify
obstacles interfering with this goal. Some obstacles they identified were similar to those found in previous studies, but some differences did exist. For instance, these faculty members approached the barrier of "limiting class size" from the domain of wanting to engage all the students in the class instead of restricting numbers of participants. A previous study had noted a fear of technology on the part of the nursing faculty which was not apparent in this study, possibly because these participants had volunteered to learn more about manikin-based simulation. However, the not applicable/attitude category of this study was very apparent. Participants did not seem to consider the possibilities of incorporating manikin-based simulation in courses not directly involved in teaching acute care technical skills. There was also some perception of lack of support from colleagues and administration by some faculty members. Inadequacies of physical facilities at their institutions and difficulty scheduling lab time were also cited (Jansen et al., 2009).

Jansen et al. (2009) concluded that it was essential to address faculty-perceived barriers to manikin-based simulation to facilitate expected student outcomes. The researchers proposed a number of specific and general solutions for managing these barriers. Solutions were based on ideas from the review of the literature and experiences of the research team.

Following are some of the researchers' proposed solutions for the minimization of obstacles to utilizing manikin-based simulations. University or college advancement personnel should be aware of nursing's needs for acquiring and maintaining costly lab equipment and staffing. Donors might be more willing to provide support if they were aware of concrete, specific needs. Also, inter-institutional agreements might be
established between educational and health care facilities for the purpose of sharing staff and resources. Simulation scenarios might also be shared by individuals and educational institutions. Examples cited were the National League for Nursing's Simulation Innovation Resource Center and the International Nursing Association for Clinical Simulation and Learning. Aging and retired nursing faculty members and nursing students might also be willing to provide assistance in the simulation lab. Graduate students might be able to develop simulation scenarios to fulfill course requirements. The researchers also cited creative options for filling roles in a scenario; i.e. pastors, therapists, family members. Those who volunteer their time for this experience should be acknowledged for their contributions, perhaps through recognition dinners so they know their work was appreciated (Jansen et al., 2009).

The researchers also proposed that educational programs could increase faculty members' attitudes toward and intentions to use manikin-based simulation. While it might not always be feasible to give every faculty member extensive training in simulation, the WI-TECNE project trained a limited number of faculty from each institution. These faculty were identified as superusers and had additional responsibility for simulations as part of their service workload. They also promoted and assisted other faculty members with the use of simulations and shared ideas for using simulations creatively (Jansen et al., 2009).

The researchers also proposed numerous ways of using manikin-based simulations for clinical laboratory, theory, online, and distance education courses. Simulation scenarios have been uploaded to online nursing courses in both on-campus and distance education classes. Live simulations have been broadcast to distant
classrooms so students viewing them can critically think through patient conditions and critique the roles of simulation actors. Cameras have been beneficial in enabling intricate procedures to be seen "close-up" by large numbers of students. Students rotate through different "stations" in groups of six or eight so the entire class is engaged. Some stations may be set up as unsupervised modules. Several activities have been completed by the end of the laboratory session (Jansen et al., 2009).

Jansen et al. (2009) summarized that nursing faculty from associate and baccalaureate programs identified a number of perceived barriers to the implementation of manikin-based simulation into their courses which may affect the teacher factors element of Jeffries and Rogers's 2008 Simulation Framework. A number of solutions were proposed to minimize obstacles to the utilization of manikin-based simulations. However, the researchers indicated that further research must be done to determine the effectiveness of such proposals. One identified limitation of this research study was its narrow focus. A small, homogenous convenience sample was used in this study, so larger studies with a more diverse sample need to be performed. Also, future research should be broader and address additional educator characteristics such as teaching and clinical experience and their impact upon perceived obstacles to using simulation. Participants in this study might not have been typical of nursing faculty because they volunteered. Another limitation was that study participants were not asked to indicate if the barriers they identified pertained to low-, moderate-, or high-fidelity manikins, though many of their concerns seemed to be related to the use of high-fidelity manikins. These faculty members were creatively overcoming their identified obstacles to incorporate more manikin-based simulation into their courses, as it was required by the WI-TECNE
project. Findings from this study suggested that educator awareness of ways to use manikin-based simulation creatively and frugally in numerous nursing courses was needed (Jansen et al., 2009).

Nursing students need clinical skill practice prior to actual patient care to assure a safe, confident, and competent practitioner. For various reasons, these experiences are not always available at the actual clinical site. Life-like mannequins have been introduced to many clinical learning centers for the purpose of providing meaningful simulated learning experiences for students. For maximum benefit to students, it must be understood how they perceive their mannequin-based clinical learning experiences. This will help lead to the achievement and evaluation of the right outcomes and the assurance that technology is being embraced and utilized appropriately. Many studies on the benefits of simulation from the viewpoint of the students have been performed. Fewer studies have been performed exploring the perceptions of nursing faculty as well as student perceptions regarding the usefulness of simulation and their role in its implementation and application. The purpose of the Akhtar-Danesh, Baxter, Valaitis, Stanyon, and Sproul (2009) study was to explore nursing faculty members' views about the use of simulation in nursing education. No particular theoretical framework or theory was cited in the study.

The setting for the study encompassed 17 universities and colleges in Ontario with 24 undergraduate nursing students participating. Two students from each of the universities or colleges were asked to participate with 24 students actually participating in the study. Most of the students were in their third or fourth year. Ethical approval was
obtained from each participating institution. Students could ask questions of the researchers prior to signing study consent (Akhtar-Danesh et al., 2009).

Student perceptions on the use of simulations were explored by the use of Q-methodology. The common viewpoints of students who had been exposed to simulated experiences as part of their nursing education were identified. Q-methodology was selected by the researchers for its potential to be used to identify both unique and commonly shared viewpoints. Qualitative and quantitative research methods were mixed in the q-methodology with the goal of discovering different patterns of thought. Q-sorting test-retest reliability had been found to be 0.80 or higher ((Akhtar-Danesh et al., 2009).

Another phase of this study involved focus groups composed of 37 faculty members, each with at least five years of teaching experience, from four colleges and three universities. One-hundred and four statements were drawn from transcripts of the focus groups and compiled into one data set. An inductive process was used to have a representative Q-sample. Six major categories emerged from the aggregate statements. Major categories included the following: teaching and learning, access/reach, communication, technical features, technology set-up and training, and comfort/ease of use with technology. The research team refined the statements within each category or domain. An iterative consensus process, group meeting, and independent consideration were used until consensus on the most appropriate use of the statements was achieved. A pilot test was performed with the final set including 43 statements representing key ideas from each category regarding the use of simulation in nursing education (Akhtar-Danesh et al., 2009).
A grid was then constructed by Q-study participants sorting randomly numbered final statements and scoring each statement between -4 and +4. Negative scores indicated disagreement and positive scores indicated agreement. Each participant assigned two statements with a score of -4, two statements with a score of +4, three statements with -3, three statements with +3, and so on. Each respondent completed the Q-sort independently and also answered a short survey with questions pertaining to previous experiences with simulation and demographic information (Akhtar-Danesh et al., 2009).

Qsorts were analyzed using the PQMethod 2.11 program. Groups of participants with similar viewpoints were identified via a by-person factor analysis of the Q-sort. The methods of principal component and centroid factor extraction were implemented with two methods of rotation. A group meeting of all authors then occurred for purposes of interpreting the factors and reaching consensus for assigning a name to each factor and describing the viewpoint (Akhtar-Danesh et al., 2009).

Of the 37 original faculty in the study, 28 participated in the response. Age varied from 31 to 60 years (M= 45.4 years, SD = 9.0 years). Years of teaching varied from 1 to 31 years (M = 9.8 years. SD = 8.8 years). Faculty taught in level 2, level 3, or level 4 of their respective nursing programs. The participants felt a medium (n = 13, 46.4%) or high (n = 14, 50%) comfort level with technology with one respondent reporting low comfort (3.6%). Twenty-two persons reported medium or high exposure to high-fidelity simulation, 23 reported medium or high exposure to medium-fidelity simulation, and 19 had medium or high exposure to low-fidelity simulation. Faculty reported that simulation was used most often to support clinical or theoretical/problem-based learning and less
frequently for remediation or replacement of clinical experiences (Akhtar-Danesh et al., 2009).

Four major viewpoints describing four groups of faculty emerged from the factor analysis of Q-sorts. Factor 1 was referred to as the positive enthusiasts. Nine faculty loaded on this factor and reflected the view that learning can be greatly supported by simulations and that simulations make learning in the clinical setting more valuable. They did not agree that laboratory limitations on space and time made simulations difficult or that "the hardest part (of simulation) is developing accurate and believable scenarios" (Akhtar-Danesh et al., 2009).

Factor 2 responders were called "supporters" and were composed of five faculty members. The supporters believed that learning in the clinical setting was made more valuable by simulation and that simulation provided opportunity for critical thinking, especially for Year 1 students. They also believed that simulations helped students adjust to real-life clinical settings. They felt that students considered the mannequin as a patient and that students could tell if they are actually hurting their "patient." They did not see scheduling as being a nightmare (Akhtar-Danesh et al., 2009).

The "traditionalists", who included seven responders, made up Factor 3. The traditionalists believed that simulation enhanced, but could not replace, actual clinical experience. They did not support less clinical time over the labs and scenarios of simulation and did not believe simulation helped students adjust to the role of the nurse. They also disagreed that simulations helped students in learning to communicate with patients or prepared the students for community placements. They did, however, support
a repository composed of creative resources such as simulation scenarios (Akhtar-Danesh et al., 2009).

Factor 4 respondents were called the "help seekers," and included three faculty members. They agreed with the traditionalists that a provincial repository of simulation scenarios was needed and also expressed the need for more education for faculty on simulation. They, along with the traditionalists, believed that more human resources were needed within the faculty to fully integrate simulation into the curriculum, and that simulations were time-intensive for faculty and were not presently built into their allotted teaching time. They also stated that there were not enough mannequins to support learning. They did not agree that the most difficult part of simulation was developing accurate scenarios (Akhtar-Danesh et al., 2009).

Akhtar-Danesh et al. (2009) identified six consensus statements which were scored similarly by all faculty members. Faculty agreed that "simulation fills the gap because they are not always going to have a chance to perform the activity in a clinical setting and if they can simulate it, then students can at least get a feel for it." Faculty members disagreed that present difficulties were due to an insufficient number of mannequins, that greater use of simulation translates into greater cost, and that simulations help students to learn to prioritize care of more than one patient. All four groups responded neutrally to the statements, "Using simulation does build students' confidence . . . " and "we have been using simulations in nursing education for years" (Akhtar-Dahesh et al., 2009, p.320, 323-324).

This study, as the first to examine faculty viewpoints on simulation on a large scale, provided new insight to increasing the implementation of simulation and potential
associated barriers. Some descriptors for types of faculty members within a large number of nursing schools in Ontario were provided. There were, however, some limitations to the study. Since not all schools participated, data may not have fully represented all faculty members' experiences. Also, because data were collected just two to three years after the schools had received simulation equipment, faculty may have had limited exposure to the equipment and insufficient time to become proficient in using it. It may have not yet been well-integrated into the curriculum. Finally, more research was needed to discover what learning can best be supported by simulation and to identify the best practices for the use of simulations in nursing education (Akhtar-Danesh et al., 2009).

The researchers concluded that, overall, simulation was perceived by nursing educators as a valuable tool to support learning for students, but not one that can replace "real-life" clinical learning. Findings from the study suggested that nursing faculty were divided into one of four domains in regard to the perception of simulations and nursing education. These domains were positive enthusiasts, supporters, traditionalists, and help seekers. Few negative voices were heard, but many faculty believed simulation required additional support of time required to use this modality in teaching and additional human resources for its support (Akhtar-Danesh et al., 2009).

Bray, Schwartz, Weeks, & Kardong-Edgren (2009) surveyed non-university healthcare educators and providers and university health sciences faculty's attitudes toward the integration of human patient simulation (HPS) technology into curricula. The researchers' review of the literature confirmed that HPS was widespread in medical, nursing, and pharmacy education and had become pervasive in the workplace to document skill competencies in all areas of healthcare.
Although some surveys of nursing educators related to their experiences with HPS have been done, the researchers indicated little was known about the opinions regarding the usefulness of HPS to educators in other health care disciplines and/or perceived barriers to HPS implementation. The interest and attitudes of potential HPS users in health care disciplines other than nursing must be gauged to determine if common ground for interdisciplinary collaborative HPS programs exists (Bray et al., 2009).

This research was undertaken without a theoretical hypothesis or framework. However, major themes examined focused on the role of HPS in clinical skill development, learning, and evaluation of student learning. Also, barriers to the integration of HPS into curricula were identified. The university institutional review board approved the survey methodology and instrument content (Bray et al., 2009).

Community forums designed as informational sessions featuring simulation demonstrations, podium presentations, and discussions regarding HPS were held by the researchers over a three month period. The forums served to identify survey respondents by their attendance. Health care disciplines of pharmacy, nursing, physical therapy, emergency response, dentistry, exercise science, and speech and hearing science were all represented at the forums. Faculty from two state universities, one private university and two community colleges participated in the survey, as well as health care educators and providers from ambulatory care clinics and local medical centers. The sample consisted of 45 participants and was made up of 60% college and university faculty with the remainder being community health care providers and educators. Academic units of the faculty respondents were pharmacy (35%), physical and occupation therapy (30%),
exercise science (19%), nursing (12%), and speech and hearing therapies (4%). Women constituted 60% of respondents; 50% of respondents were age 49 or younger. The sample was relatively inexperienced in the use of HPS with 22% reporting experience with HPS in either school (9%) or to deliver instruction (13%). Sixty-two per cent indicated no hands-on experience with HPS and 20% reported having practiced more than once with HPS (Bray et al., 2009).

Experts in instruction with HPS or research methodology developed survey items and continued to revise them until consensus with a final item pool was reached. Closed-ended items asking about the demographics and previous experience with HPS of respondents were contained in each survey. Also contained was a three-point response scale asking if the addition of HPS to curriculum would enhance specific clinical skills in learning and practice, skill assessment, or teaching. A score of one indicated no enhancement, a two indicated some enhancement, and three indicated much enhancement. The degree of concern with common barriers to HPS implementation was also surveyed by the use of a four point scale with responses spanning from no concern at all (one) to extreme concern (four). Comments about each major theme of HPS implementation were gathered by including several open-ended items. Confidential responses to the survey were obtained by e-mail. To encourage responses, repeat e-mails were sent after two weeks to non-respondents (Bray et al., 2009).

Forty-five of the 59 people who had attended the HPS demonstration forums responded to the survey. This was a response rate of 76%. Analysis included the quantitative data from closed-ended items being reported as proportions. Chi-square was used for analysis of bivariate responses to HPS implementation items and relationships
among respondent demographics. Conduction of analyses was done with SPSS version 15.0 and a Type 1 error rate \( p < .05 \) was used for all bivariate analyses (Bray et al., 2009).

Responses to specific clinical skills were listed with regard to instructional use of HPS. Seventy-three per cent of respondents strongly agreed, 22% agreed, and 4% strongly disagreed that a role existed for HPS technology in health care science curricula. There was strong consensus that HPS could enhance instructional areas such as medication therapy management, interdisciplinary health care team interactions, credentialing, patient evaluation skills, and teaching, practice, and assessment of medical procedures. Less agreement among respondents existed regarding the use of HPS to enhance communication skills between providers or provider to patient (Bray et al., 2009).

Responses were also reported of the degree of concern respondents placed on common barriers to the use of HPS. Eighty-nine per cent had moderate to extreme concern about the high cost of the HPS technology, and 56% expressed moderate to high concern regarding possible inadequacy of faculty training. Increased workload for faculty to integrate HPS into instruction was a moderate to extreme concern for 43% of respondents; a similar level of concern was expressed about administrative support for preparation time to teach using HPS. The lack of evidence showing HPS as superior to conventional methods of learning concerned 66% of respondents only mildly or not at all. Most respondents did not see the complexity of HPS as being a barrier to its implementation by students (98%), or faculty (68%), and little concern (91%) was expressed that it would be unrealistic to transfer HPS to actual patient care (Bray et al., 2009).
The bivariate analyses reported responses by gender, age group, academic discipline, university affiliation, and number of years in current position. No differences in survey responses were shown by gender, academic discipline, or number of years in current job (all chi-square < 2.2, all p > .05). However, though 67% of university faculty was unconcerned about HPS being too unrealistic to transfer to clinical practice, 63% of non-university educators expressed mild concern (p=.009). Respondents in the age range of 30-59 most frequently expressed moderate concern (40-42% of respondents) that a barrier to the use of HPS (p=.037) could be inadequate faculty training. Respondents older than 59 or younger than 30 had no or mild concern that lack of adequate faculty training could be a barrier (67-75% of respondents). Other survey responses were not differentiated by age group (all p > .05) (Bray et al., 2009).

The researchers concluded that valuable information about the perceptions educators have about successful adoption and perceived barriers of HPS technology in health care learning was obtained in this study as well as perceived barriers to its successful adoption. Except for communication, responses did not significantly differ from university affiliated and non-university affiliated educators. Collaboration for development or maintenance of HPS programs bodes well because of this commonality of responses. Though fewer community educators believed that HPS could enhance students' communication skills, this may be because respondents were not aware of the capabilities of manikins during patient care scenarios. Some can have actual "conversations" with the caregiver, and scenarios can be designed for the student to interact with family members as well as the patient. The researchers had no rationale as to why respondents believed that HPS would enhance interdisciplinary health care
interactions but would not facilitate communication skills. It was hypothesized that possibly as educators become more aware of the capabilities of simulators, their expectations will be changed. Concerns about users exhibiting "technology phobia" or simulation technology being "too unrealistic" were not expressed by respondents of any age. Greatest concerns were the high cost of technology, inadequate training, and increased workload for faculty (Bray et al., 2009).

The researchers recommended that the development and sustenance of collaborative, interdisciplinary HPS programs depends on finding common ground among potential users of human simulation. By being aware of commonly perceived strengths and potential barriers to using HPS in health care education, its proponents can effectively work with faculty, educators, and administrators to integrate HPS into health science curricula (Bray et al., 2009).

Student Perception of Simulation Use in Education

Fountain and Alfred (2009) explored the correlation of learning styles with student satisfaction in the use of high-fidelity human simulation in a baccalaureate nursing program. The organizational framework used by the study was Gardner's Multiple Intelligence Learning which identified different categories of learning preferences and intelligence. Categories include linguistic intelligence (writing, saying, hearing), spatial intelligence (using the mind to visualize), interpersonal intelligence (networking, interacting, listening, comparing), intrapersonal intelligence (observing and reflecting), kinesthetic intelligence (dramatizing, touching, moving), and logical/mathematical intelligence (classifying and categorizing. A sample of 104 baccalaureate nursing students from three campuses of one school of nursing participated
in this study after approval was obtained from the university's institutional review board. All students were in their advanced medical-surgical course.

Each student in the advanced medical-surgical course at each of the three sites participated in a simulation enhanced learning activity during a campus laboratory period. Students were informed of the study prior to the lab activity, which was presented by clinical instructors who had all received high fidelity simulation (HFS) training. The same HFS-enhanced cardiac case scenarios were used by all instructors from the university's three campuses. As a part of the learning activity, a debriefing session followed the simulations. The purpose of this was to allow students to reflect on their performances during the simulations. Students had at least eight hours of clinical simulation experience in prior nursing classes before participating in this study, had attended a lecture on dysrhythmias and acute coronary syndrome, and had completed five case studies on common cardiac problems (Fountain & Alfred, 2009).

Students were scheduled for three hour lab sessions. The first 90 minutes were used to review dysrhythmias and cardiac emergency medication protocols. The last 90 minutes were used to apply this content during the HFS. Affective and perceptual/motor skills were all utilized as required by the scenario. After completion of the simulation, students were asked to complete the National League for Nursing (NLN) Student Satisfaction and Self-Confidence in Learning Scale. Informed consent was implied by the completion of this instrument (Fountain & Alfred, 2009).

The instrument, the NLN Student Satisfaction and Self-Confidence in Learning Scale had 13 items with responses measured on a five-point Likert-type scale. Scores ranged from one (strongly disagree) to five (strongly agree). A satisfaction sub-scale,
consisting of five items, was also used to measure student satisfaction with the simulation experience by taking the sum of the items. Cronbach's alpha was used to test the reliability of the scale (satisfaction = 0.94; self-confidence = 0.87) according to an earlier study (Fountain & Alfred, 2009).

Findings from the study were correlated with the nurse entrance exam students had taken as part of the school's admission criteria. The SPSS 14.0 was used for data analysis. This provided descriptive statistics, tests of means, and correlations. Included in this analysis were data from students' learning style assessments and students' satisfaction with the HFS lab activity. Data from the subjects' learning style assessments were measured by percentile scores; higher scores represented a stronger preference for a particular learning style. Also, study results from each of the three campuses were compared to see if any variation in satisfaction existed by campus site (Fountain & Alfred, 2009).

The form was returned by 78 students, which was a 75 per cent return rate. Pearson product-moment correlation was used for data analysis. Social leaning, at 77 per cent was the most common learning style for this sample of students. Both social learning ($r = .29, p=.01$) and solitary learning ($r=.23, p=.04$) correlated significantly with student satisfaction with the simulation. There were just slight, not significant, differences in satisfaction with the simulation activity among the three campuses (Fountain & Alfred, 2009).

Results indicated both students with social and solitary learning style preferences were satisfied with this HFS-enhanced learning experience. Student satisfaction did correlate with learning styles. The experience was beneficial to the social learners
because they compared, listened, and interacted with others. Also, the solitary learner observed, reflected, and completed self-paced projects. The researchers reflected it was exciting and gratifying for faculty to be able to engage students with different learning styles in the same HFS activities with resulting student satisfaction and increased ability to internalize and apply new information and synthesize critical content (Fountain & Alfred, 2009).

Schoening, Sittner, and Todd (2006) implemented a nonexperimental pilot evaluation study to identify and refine simulation learning activities, learning objectives, and student perceptions of the experience. The researchers developed a scenario of a preterm labor simulated clinical experience (SCE) for use in the study. Because students rarely have opportunity to care for pre-term labor patients, this was chosen as the focus of the study. The study was conducted at a private Midwestern university where six hours of clinical time were replaced with a high-fidelity simulation. Approval for the study was given by the university's institutional review board.

A convenience sample of 60 baccalaureate nursing students participated in the study. All students were in the second semester of their junior year with average age of 22 years. Fifty-nine of the 60 were female. The school's high-risk obstetrical rotation was one of four components in a clinical course scheduled over a period of 12 weeks. The obstetrical portion lasted three weeks with seven or eight students per clinical group (Schoening et al., 2006). The SCE occurred in the last two weeks of the students' high-risk obstetrical rotation. Clinical groups spent either the morning or the afternoon at the hospital and the other half day at the school of nursing for the simulation. Students had the same clinical
instructor as facilitator for the SCE as they had in the hospital setting. Joyce and Weil's four-phase teaching model was used as a model for the simulation (Schoening et al., 2006).

Phase one of Joyce and Weil's model was orientation. Students were given an overview of the simulation and the topic of the SCE as well as the skills and concepts to be demonstrated. The second phase was participant training when the rules, roles, and procedures to be used during the SCE were reviewed with the students by the educator. Phase three was simulation operations when the SCE was conducted. Fourth and final phase was debriefing. During the debriefing, perceptions of the experience were discussed and the SCE was related to course content and compared with "real world" experience. In Joyce and Weil's model, the educator takes on one of four roles: explaining, refereeing, coaching, and discussing (Schoening et al., 2006).

During the orientation phase, students were given general information about the SCE (explaining) and assignments in their obstetric textbook to read and technical skills to review for preparation. They also were encouraged to review their notes on preterm labor from the didactic teaching they had received during the first week of the semester. The second or participant training phase was also conducted during the first week. A brief training session was held at the school's skills lab during which students were randomly assigned to the roles of "nurse" or "observer." Expectations for the SCE were explained: the same standards as for other clinical experiences would apply. Their performance during the simulation would be reflected in their weekly clinical evaluation (explanation) and clinical uniforms would be worn to the SCE. Students were reminded
to interact with the simulator just as they would with a human patient (Schoening et al., 2006).

Phase three was simulation operations. It lasted between one and two hours and was divided into two sessions. The students in the nurse group worked as a team with the faculty facilitator and the simulator. Their performance was videotaped and projected to the observation group of students who were in a separate room. The observation group evaluated the performance of their peers and developed a written care plan for the "patient." Included in the care plan were nursing diagnoses and patient-focused outcomes. The groups reversed roles and continued with part two of the SCE the second week (Schoening et al., 2009).

Two faculty members with expertise in obstetric nursing wrote the scenario used for the SCE. Students were required to admit the patient, perform assessments, call a physician for orders, and develop a plan of care. As the patient became more unstable, increased interdisciplinary communication and critical thinking were needed. The SCE eventually culminated in the delivery of a pre-term infant. The patient's voice was provided through the simulator's microphone system by the laboratory coordinator. She also provided the voice of the physician and programmed the physiological parameters of the simulation. The clinical instructor asked the students critical thinking questions and cued them if they were unsure of how to intervene (coaching and refereeing). Students were required to demonstrate multiple technical skills, perform a mathematical medication calculation, and effectively communicate with the patient, the physician, and the interdisciplinary team members (Schoening et al., 2006).
Phase four of the SCE was the participant debriefing and lasted 30 minutes to one hour. The clinical group reviewed their findings of the case and viewed the videotape. Findings and plan of care were discussed (discussing) and students had the opportunity to evaluate their own performance and identify plans for future improvement. Students were also able to share their feelings about the experience and verbalize their perceptions of the SCE's realism (Schoening et al., 2006).

Students were asked to complete a confidential 10-point evaluation of the SCE at the conclusion of the second week. The evaluation tool had been developed by the faculty who had authored the SCE and had been reviewed by two nurse educators with doctoral degrees. A four-point Likert scale was used to determine if students believed they had met the objectives for the SCE and if they believed the SCE had improved their skills, increased their knowledge of pre-term labor, or increased their confidence in the clinical setting. Narrative comments were also welcomed. Some students provided feedback regarding the SCE in their weekly clinical journals. Names of students were removed and pseudonyms assigned to this feedback to de-identify the students (Schoening et al., 2006).

The student evaluation tool used a four-point scale ranging from 1 (strongly disagree) to 4 (strongly agree) to represent the perceptions of the students regarding the simulation experience and their attainment of the simulation objectives. The grand mean for student perceptions of the SCE was 3.75 and the grand mean for the attainment of simulation objectives was 3.64. Descriptive data was gathered from the students' reflective journals and qualitative analysis was begun by simultaneously collecting.
sorting, and formatting weekly entries about the SCE experience. These comments and log entries supported the quantitative scale evaluation (Schoening et al., 2006).

Data was analyzed by using descriptive analysis to identify prominent themes or patterns in the narrative data (content analysis). Line-by-line analysis was then used to compare and cluster information. Patterns and themes were grouped and categorized and data was synthesized and relationships depicted by placing groupings in a conceptual diagram linking all categories to the SCE. Two doctorally prepared faculty members with expertise in qualitative research confirmed validation of the categories. The research team mapped aggregate data from the initial categories and matched them to the categories by Joyce and Weil (Schoening et al., 2006).

Qualitative data indicated that students had been allowed opportunity for hands-on learning and practice during the SCE. Students stated that they had a "feel for the equipment," and were glad to perform skills they had not reviewed in a "long time." A category with many student comments related to gaining self-confidence and efficacy. Students stated that simulation allowed them to go into the client's room being "more confident" and "more comfortable. . ." Also reported was that "if you mess up, you can correct yourself without incident" (unlike the real life nursing practice). Students concurred that the simulation was realistic and encouraged them to use critical thinking skills and knowledge. One stated that the experience helped her know "how to act fast in an emergent situation…" Another stated that she was able to use things that she had been learning over the past few years. Students in the observer groups expressed satisfaction and believed the SCE had value and transferability. One stated that the simulation was helpful and during observation could think of what she might or could do differently. The
SCE also fostered teamwork, communication, and preparedness and students reported enjoying working with others in their group to provide care. The SCE allowed them to assess their patient, update the physician, and obtain orders. One student reported learning "three times more in lab working with my peers and the instructor than I would ever learn in clinicals" (Schoening et al., 2006, p. 257).

The purpose of this study, to examine students' perceptions of a preterm labor SCE as a method of instruction, was realized. Quantitative data showed that the SCE was effective in meeting course objectives and increasing confidence in the clinical setting. Qualitative data from student journals suggested that hands-on practice, teamwork, communication, and decision-making skills all contributed to the increased confidence. Students reported that they valued the SCE and data presented implied that simulation helped in the preparation of nursing students as they transition to the real world of bedside nursing. These findings reinforced earlier studies such as the one by Feingold et al. (2004). This study suggested that as new nurses begin to use high-fidelity simulation, Joyce and Weil's four-phase teaching method may serve as an effective guide as they implement SCE as an instructional method (Schoening et al., 2006).

One possible limitation of this study identified by the researchers was that results may be generalizable to only students with the same characteristics as the students in this study. Results met the purpose of this study but might or might not be appropriate for other groups. Though the questionnaire used for this study had content validity, reliability or construct validity had not been established. The study evaluated student perceptions but did not evaluate outcomes of increased knowledge or skill acquisition (Schoening et al., 2009).
The researchers concluded the study has contributed to the knowledge of the use of high-fidelity simulation in nursing education. The role of the educator modeled Joyce and Weil's four-phase teaching model for simulation and incorporated elements of explaining, refereeing, coaching, and discussing on the part of the educator. More research was needed on the benefits of this method of instruction with future research focusing on measuring knowledge outcomes as well as the themes presented in this study (Schoening et al., 2006).

The needs of patients in both acute and long-term health care and cost-cutting measures in health-care institutions require nurses to be able to make effective clinical judgments. These judgments require complex reasoning and skilled nursing practices. Both the National League of Nursing (NLN) and the American Association of Colleges of Nursing (AACN) have noted that the core competency for making these effective clinical judgments (Bambini, Washburn, & Perkins, 2009).

The purpose of the 2009 study by Bambini et al. was to evaluate the effectiveness of simulated clinical experiences as a teaching/learning method to increase the self-efficacy of nursing students during their first clinical course of a baccalaureate program. The framework for the study was Bandura's Self-Efficacy.

The setting for the study was a mid-sized college of nursing located in a Midwestern state. The population used was baccalaureate nursing students in their first semester of clinical nursing. Participation was voluntary. The final sample included 112 students who completed the pretest and posttest surveys. The study took place over a four-semester period with 224 students potentially involved. The students were asked (on a voluntary basis) to complete three surveys: a pretest (before the simulation), a posttest
(after the simulation), and a follow-up survey (after the first actual clinical day). Because only 20 students submitted the follow-up survey, it was not analyzed. Of the 112 students who completed the pre and posttests, the mean age was 24.85 years, 57% had previous clinical experience, and 26 had baccalaureate degrees in a field besides nursing (Bambini et al., 2009).

The instrument used to measure variables in this study was a three-part survey: a pre-test, a posttest, and a follow-up to be completed after an actual clinical day. The posttest and follow-up surveys also featured three open-ended questions. Approval of the study was obtained from the university and a copy of the informed consent document was given to students who participated on an anonymous and voluntary basis. The surveys were each numbered and color-coded so pretest, posttest, and follow-up surveys could be matched. Students were told that returning blank surveys was acceptable if they did not wish to participate. This helped avoid peer pressure to participate. Prior to the simulation, students were afforded time to complete the survey if they so desired. Faculty was not present. The posttest was to be completed after the simulation and both pretest and posttest placed in an envelope and then in a drop box in the school building anytime over the next week. Follow-up surveys were returned after the first day of actual clinical experience (Bambini et al., 2009).

The instrument used for this study was a survey with six questions designed to measure students' self-efficacy before simulation, after simulation, and after the first actual clinical day. It was given as a pretest (before simulation), posttest (after simulation), and follow-up (after first clinical day). Each question was answered by using a 10-point scale. Scores ranged from 1 (not at all confident) to 10 (very confident).
Higher scores indicated higher self-efficacy. In addition, three open-ended questions appeared on the posttest and follow-up. A panel of faculty with obstetric or educational expertise not involved in the research determined content validity of the survey. Pre-simulation preparation for the students included standard readings and videos. A three-hour mandatory simulation lab consisting of eight stations featuring various obstetric focused learning activities was attended by the students. Both high and medium fidelity simulations were used. Students rotated through the eight stations in groups of four and practiced various assessments and clinical scenarios. Faculty watched the simulation via closed-circuit camera and debriefed students at station five. Two faculty members and the learning lab coordinator conducted the research. Reliability was not reported in this study (Bambini et al., 2009).

A 50% response rate was obtained with 112 students returning both pretest and posttest surveys. Summative scores for the returned surveys were calculated to obtain self-efficacy scores for postpartum exam. Internal consistency was acceptable. The first question explored if the simulated experience increased the self-efficacy of students prior to practicing in the obstetrics clinical setting. Findings indicated a significant increase in students’ confidence for the skills addressed except for performing a breast exam and measuring vital signs. The Wilcoxon Matched-Pairs Signed-Ranks test was used to analyze the returned surveys for the purpose of detecting changes in the level of self-efficacy in postpartum nursing skills. A $t$-test analysis compared the means of the pre-test and posttest summative scores to determine if a significant change existed in student self-efficacy in performing postpartum skills after having participated in the simulation lab. Answers to the open-ended questions were analyzed by the researchers and then
categorized to fit with the conceptual framework of Lenburg's eight core practice competencies (Bambini et al., 2009).

Quantitative results using the pairwise comparative analysis showed a significant gain in student self-confidence in carrying out a postpartum exam after completing the simulation. Also demonstrated was that student confidence scores for each of the five skills addressed in the simulation (vital signs, breast exam, assessment of fundus, assessment of lochia, and patient teaching) increased after the simulation. For the skills of measuring vital signs and breast exam, more ranks were tied than negative or positive. The Wilcoxon Matched Pairs Signed Rank test was used for this. The variables of age, previous degrees, or previous work with patients had no effect on these results (Bambini et al., 2009).

The second research question addressed the students' perceptions of the simulated clinical experience. Qualitative findings suggested that students found this experience to be a valuable one in which their confidence in what to expect and how to conduct themselves in the clinical setting was increased. Three themes emerged from the qualitative comments of survey participants; communication: both verbal and non verbal with patients and families, confidence in patient interactions and psychomotor skills, and clinical judgment (Bambini et al., 2009).

Examination of the effect previous experience working with patients had on students' perceived level of confidence in the clinical skills was the focus of the third research question. Quantitative findings indicated that previous experience working with patients had no effect on students' perceived level of confidence in clinical skills (Bambini et al., 2009).
The researchers concluded that realistic simulations as a teaching tool have become much more feasible in recent years with the advancement of technology. This study was a preliminary investigation into the usefulness in clinical simulations to increase self-efficacy in nursing students (Bambini et al., 2009).

Findings suggested that clinical simulations have a positive effect on self-efficacy of students. The researchers identified a limitation of this study in that it relied on self-reported data which could be subject to a social-response bias. Anonymity on data collection possibly minimized this limitation. A second identified limitation was that the researchers had no control over which students chose to participate in the study which could have threatened the validity of the study. Also, scenarios for each student or group of four students differed slightly. The researchers emphasized that self-efficacy in nursing is important; however they concluded that the use of simulation to evaluate a student's ability to prioritize and give safe care needed further research (Bambini et al., 2009).

Sinclair and Ferguson (2009) studied the integration of simulation in a nursing theory course to assess students' perceptions of self-efficacy for nursing practice. The study was mixed-method and was based on Bandura's Theory of Self-Efficacy as the conceptual framework. Two research questions were considered in this study. The first question focused on what the effect of an educational strategy that combined classroom and simulated learning activities would be on students' perceptions of self-efficacy for nursing practice. Secondly, what was the effect of an educational strategy that combined classroom and simulated learning activities on students' satisfaction, effectiveness, and consistency with their learning styles with the intervention?
The convenience sample consisted of 250 students enrolled in a collaborative baccalaureate program at two delivery sites of an urban university in southwestern Ontario. All students were in their second year of study. Students at one site were the intervention group (n= 125) and students at the other site were the control group (n= 125). Research educational boards at both educational sites granted permission for the study. Students in the intervention group had never before participated in simulation learning activities. Neither student group were enrolled in other classes that used simulation. Students were required to attend lectures or lectures and simulations as part of course requirements. Completion of questionnaires and reflective journaling were voluntary and anonymous. Response rate ranged from 23 to 75 participants for the control group and 26 to 68 participants for the intervention group. Response rate declined as the academic year progressed (Sinclair & Ferguson, 2009).

A course focused on episodic health challenges across the lifespan was selected for this study. All 250 students were enrolled in this course which had a companion clinical course which offered experiences in adult acute care, community child health, and adult mental health. Three lecture topics in adult health, one in mental health, and one in child health were chosen for this study. Two hour lectures on these topics were given to the control group. The intervention group had one hour of lecture and one hour of a simulated learning activity on each topic. The simulated learning activities were reviewed by faculty content experts for course relevance. Role-playing and mid-fidelity mannequins were used to enhance the reality of the scenario, which required students to assess the patient, determine priority needs, implement one or two nursing interventions, and evaluate the response of the patient. The simulations occurred in the Clinical
Education Suite, located on the university campus. The scenario was presented to a group of students at the patient's bedside by faculty facilitators. Students were able to access physician orders, lab data, and medication administration records as well as appropriate equipment and supplies. Faculty prompted and cued students during the scenario which concluded with a 10 minute debriefing to evaluate the effectiveness of nursing care (Sinclair & Ferguson, 2009).

Small groups participating in the simulated learning exercise did not exceed six students. Groups were assigned by using an online self-scheduling tool so conflicts with other classes in which students were enrolled could be avoided. Concurrent sessions with four faculty facilitators were held (Sinclair & Ferguson, 2009).

A demographic questionnaire was completed by all students. Students from both the control and intervention groups also completed a modified Baccalaureate Nursing Student Teaching-Learning Self-Efficacy Questionnaire which had been developed for pre-and post-lecture or simulated learning activity. Using Cronbach's alpha, the original questionnaire had an established reliability of 0.97. This tool contained 16 nursing practice behaviors and had been adapted from a competency-based tool which was used to evaluate clinical practice throughout the undergraduate nursing program. Students used a Likert scale to rate their perceived self-efficacy for each item, using a range from "not confident at all" to "very confident." The focus of the items included various aspects of nursing care, the selection of appropriate nursing interventions, the provision of appropriate information to patients, and documentation. The modified tool was reviewed for content validity by two nursing education experts; reliability of the tool was not determined. Effectiveness, satisfaction, and consistency with learning style were also
rated by students in both groups after all five lectures and simulated learning activities were completed. A researcher-developed questionnaire using a Likert scale was utilized for this. This tool was based on the researchers' own experiences as well as a review of nursing literature related to simulation. Questions focused on the congruence of the learning activity to individual learning style, the articulation of expectations related to the simulation, time allowed for questions, and the realism of the simulation. The intervention group also completed a reflective review of their learning after the occurrence of all simulations (Sinclair & Ferguson, 2009).

Paired t-tests of pre/post ratings were used to analyze the self-efficacy questionnaires. Researchers reviewed responses to open-ended questions in the satisfaction questionnaire and identified common responses. Control and intervention groups were similar in demographic data such as age and composition. However, students in the control group reported having had more previous health care experience (Sinclair & Ferguson, 2009).

Mean differences in pre and post self-efficacy questionnaires for both groups were calculated using paired t-tests. Results indicated significant differences between pre- and post-test scores for the intervention group for all but one simulation exercise (Sinclair & Ferguson, 2009).

Satisfaction ratings were tabulated for both the intervention and control groups in this study. Ninety-one percent of the intervention group said that the lecture/simulation learning activity was effective or very effective for their learning. Sixty-one percent of the control group reported lecture only to be effective or highly effective for learning. Ninety-one percent of the intervention group students reported being satisfied or very
satisfied with their lecture/simulation combination with 70% of the control group reporting satisfaction with their lecture only method. Consistency between the combined lecture/simulation learning activity and their learning style was reported as 91% for the intervention group; the consistency between the lecture method and the learning style for the control group was 76% (Sinclair & Ferguson, 2009).

Just 12 students voluntarily completed reflective reviews. Peer learning opportunities, reinforcement of knowledge, and improved confidence were the valued aspects of simulated learning activities most described. After participating in the lecture/simulation activities, intervention group students reported greater levels of confidence. Students in the control group requested "more opportunity for hands-on learning," "different teaching methods besides power point," (Sinclair & Ferguson, 2009, p. 7) more interactive activities, and the use of case studies.

Findings of this study suggested that educational interventions of lecture only or combined lecture/simulation activities both resulted in perceptions of increased self-efficacy. However, greater increases were shown in the intervention group with differences in ratings statistically significant for four of the five simulations. Possibly due to the fact that more students in the control group reported having had previous health care experience, this group rated themselves higher in both pre- and post-self-efficacy in all the lecture and lecture/simulation activities than did the intervention group. No correlation was discovered between demographic variables and self-efficacy ratings (Sinclair & Ferguson, 2009).

Bandura's (1977, 1986) theory, which holds that students' prior learning forms an important foundation for the integration of new knowledge, was supported by the
findings of this study. Students applied learning obtained from didactic classroom studies
to the simulated learning experience. Sinclair and Ferguson (2009) believed this might have contributed to the improved confidence and valued peer learning experiences described by students as well as to the increased ratings and perceived consistency of learning.

Also reported by students was that working with peers during the simulation effectively promoted their learning which was consistent with Bandura's (1977, 1986) contention regarding vicarious learning as a source of information contributing to the development of self-efficacy. The immediate feedback received as part of the simulated learning activity also helped foster students' sense of self-efficacy. Some students stated feeling less anxious about actual clinical practice after engaging in the simulations. This supported Bandura's claim that the psychological state of the learner may influence perceptions of self-efficacy (Sinclair & Ferguson, 2009).

According to the researchers, the main disadvantage in using the lecture/simulation approach to teaching was the additional time required of faculty to offer small group learning activities. The researchers concluded faculty fatigue, the availability of human resources, and scheduling problems all need to be addressed when planning the use of this type of teaching. Also, survey completion was difficult for both intervention and control student groups (Sinclair & Ferguson, 2009).

A small sample size and low response rate to questionnaires were limitations identified by the researchers to this study. Another possible limitation was that students chose their own simulation groups according to their availability and were not randomly assigned. Also, though significant numbers of students attended the lectures and
combined activities, many elected not to complete the questionnaires (Sinclair & Ferguson, 2009).

The researchers concluded this study with its combined lecture and simulation learning activities was time and labor-intensive for faculty. However, based on student feedback, it was a worthwhile and successful endeavor. This was the first known and reported study which replaced classroom content normally delivered by lecture with simulations. The researchers concluded additional research was needed to assess clinical learning outcomes that may be derived from the use of simulated learning activities (Sinclair & Ferguson, 2009).

Factors examined in the descriptive, correlational study by Smith and Roehrs (2009) were student satisfaction and self-confidence as outcomes of a high-fidelity simulation (HFS) experience. The theoretical framework used for this research was the NLN Nursing Education Simulation Framework, which was developed for designing, implementing, and evaluating the use of simulation in nursing education. There were five major components of the framework: teacher factors, student factors, educational practices, design factors, and outcomes. Each factor had one or more associated variables. In addition to the measurement of student satisfaction and self-confidence, this study examined the correlation between two other components described by the model: student demographic characteristics and simulation design characteristics.

The five research questions of the research study were: "(1) How satisfied are bachelor of science (BSN) nursing students with an HFS scenario experience?, (2) What is the self-reported effect of an HFS scenario experience on BSN student self-confidence?, (3) How do BSN nursing students evaluate an HFS scenario experience in
terms of how well five simulation design characteristics are present in the experience?, (4) is there any correlation between the perceived presence of design characteristics and reports of satisfaction and self-confidence of BSN nursing students who take part in an HFS experience?, and (5) is there any correlation between demographic characteristics of BSN nursing students and reports of satisfaction and self-confidence after an HFS experience?" (Smith & Roehrs, p. 75). This study was conducted at a school of nursing at a public university in the Western United States. Permission to conduct the study was granted by the university's institutional review board.

The sample was 68 of the 72 junior BSN students in their first medical-surgical course who agreed to participate in the study. All students completed a high fidelity simulation (HFS) experience related to the care of a patient with a respiratory disorder as part of the course. This simulation experience was mandatory but participation in the research study was not. Students completed the HFS on one of four days during the ninth and tenth week of the course. After being divided into groups of four, two students acted in the role of the nurse and two were observers. The "nurses" were to conduct a physical assessment and administer medications and the observers were to record observations. The scenario was stopped after 20 minutes or when the students had successfully intervened to help the elderly patient in respiratory distress if that came first. After debriefing, the students completed the research study instrument (Smith & Roehrs, 2009).

A demographic instrument designed by the researchers was used to describe the student sample and assess any correlation of demographic characteristics to the satisfaction and self-confidence of the students. The Student Satisfaction and Self-Confidence in the Simulation Design Scale (SDS), developed by the National League for
Nursing (NLN), were also used in the study. Both instruments were self-reporting, used five-point Likert scales, and were reviewed for content validity by 10 experts in medical-surgical nursing. A not applicable response was provided as an option on the SDS (Smith & Roehrs, 2009).

Cronbach’s alphas of 0.94 were reported for the Satisfaction subscale and 0.87 for the Self-Confidence subscale. The SDS of 20 items within the five subscales of objectives, support, problem-solving, feedback, and fidelity, had a reported Cronbach’s alpha of 0.92 (Smith & Roehrs, 2009).

Ninety percent of the participants in this study were female. The average age of the participants was 23.4 years (SD=5.4). Besides nursing school, 69 percent had had no experience working in health care. Most students (82 per cent) had worked with a respiratory patient in the clinical setting, and 47 percent had had no experience working with HFS prior to the study. Data was reviewed for outliers and entry errors and all errors corrected. Data analysis was then conducted for each research question using SPSS 15. Initially, descriptive statistics were used to answer each question (Smith & Roehrs, 2009).

Responses for question one (satisfaction of BSN nursing students with HFS scenario) ranged from one to five on the five-point Likert scale. The mean score was 4.5 (SD=0.5). Students were satisfied with the HFS scenario experience. To determine any discrepancy in satisfaction between students with and without previous experience with this type of (respiratory) patient, a Mann-Whitney U was conducted. Students with experience had a mean satisfaction score of 4.5 (SD = 0.5), and students without
experience had a mean satisfaction score of 4.6 (SD = 0.4). This difference was statistically insignificant (Smith & Roehrs, 2009).

Scores on question two (self-reported effect of an HFS scenario experience on BSN student confidence) ranged from one to five on the Likert scale with a mean score of 4.2 (SD = 0.4). This data suggested that following the experience, students felt confident in their ability to care for a patient with a respiratory condition. Again, analysis was conducted to learn if prior experience with a respiratory patient had any impact on self-confidence. Results showed the mean self-confidence score for students with experience to be 4.2 (SD = 0.5) and 4.3 (SD = 0.4) for students without experience. Based on a Mann-Whitney U, this difference was not significant (Smith & Roehrs, 2009).

Question three (BSN nursing students evaluation of the HFS scenario in terms of how well the five simulation design characteristics were present in the experience) had scores from the SDS ranging from two to five with scores ranging from one to five. These responses indicated positive feelings toward the five design characteristics in the study. Guided Reflection was the design characteristic with the highest mean score (M = 4.8, SD = 0.4). However, this mean score was just slightly higher than that of objectives (M = 4.4, SD = 0.5), which was the characteristic with the lowest score (Smith & Roehr, 2009).

Research question four examined any correlation between the perceived presence of design characteristics and reports of satisfaction and self-confidence of BSN nursing students who took part in an HFS experience. The Spearman's Rho noted statistically significant correlations but none were greater than the suggested 0.7. Objectives was the design subscale with the highest correlation to both student satisfaction ($r_s = 0.614$) and
self-confidence ($r_s = 0.573$), indicating a moderate correlation between this characteristic and these outcomes. Guided Reflection had the lowest correlation with satisfaction ($r_s = 0.452$) and Fidelity had the lowest correlation with self-confidence ($r_s = 0.430$), indicating a weak to moderately weak correlation (Smith & Roehrs, 2009).

As no strong correlations existed between any design characteristics and outcomes of satisfaction or self-confidence, a multiple linear regression analysis was performed to determine if a combination of characteristics might better explain the outcomes. This analysis found that 46.9 percent of the variance was explained by the five design characteristics together with Objectives significantly contributing to the level of satisfaction. An additional regression analysis was performed with just Objectives; this analysis revealed that this characteristic alone contributed to 35.7 percent of variance satisfaction. With self-confidence, more than 45 percent of the variance was explained by the combination of the five design characteristics. The only single characteristic found to significantly contribute to self-confidence was Problem Solving. An additional analysis found that Problem Solving contributed to nearly 34 percent of variance in self-confidence (Smith & Roehrs, 2009).

Research question five sought to learn if any correlation between the perceived presence of design characteristics and reports of satisfaction and self-confidence of BSN nursing students who took part in an HFS experience existed. A Spearman's rho (0.05) was used to determine that no significant correlations existed between any of the demographic characteristics of age, gender, previous degree, health care experience, and simulation experience. Multiple linear regression was performed to find if any combination of these characteristics could predict the outcomes of satisfaction and self-
confidence better than a single demographic characteristic. The resulting model was not significant. Another analysis was performed to find if a combination of demographic and design characteristics might better predict these outcomes. This analysis found that though a combination of demographic and design characteristics contributed to half the variance in satisfaction and self-confidence when using HFS, only the design characteristics of Objectives and Problem Solving were significant factors in a model predicting these outcomes. Demographic characteristics were found to be in no way significant (Smith & Roehrs, 2009).

The findings from this study suggested that nurse educators must carefully choose the design of any HFS experience for nursing students. All five design areas would be addressed if a template for their consideration could be integrated. However, time required by faculty to appropriately address these characteristics may be limited. In this study, the two most significant design factors that emerged were Objectives and Problem Solving. This suggested that nurse educators designing an HFS experience should have clear objectives and an appropriate problem to solve. Further studies are needed with a larger sample, multiple types of learning experiences, and students of various levels and from various programs. Also needed are studies using experimental designs that lead to better conclusions regarding the cause and effect and interrelatedness of factors related to these outcomes. Just two outcomes described by the Nursing Education Simulation Framework were addressed by this study. Research examining the other outcomes of learning, performance, and critical thinking described by the framework are also needed (Smith & Roehrs, 2009).
Baxter, Akhtar-Danesh, Valaitis, Stanyon, and Sproul (2009) investigated the perceptions of nursing students regarding simulated experiences. The study was prompted by the government's purchase of simulation equipment for undergraduate schools of nursing in Ontario as a potential remedy to the shortage of clinical placements for nursing students.

The researchers' review of the literature indicated various themes related to nursing students' perceptions of simulated experiences. Simulations may not appropriate for all students. Some students prefer experiences with a "real" person rather than a mannequin. Other students found simulations so lifelike that they were stress invoking and traumatizing. Other students had difficulty in transferring skills learned in simulation to the actual clinical setting (Baxter et al., 2009).

The purpose of the study was to explore the perceptions of students toward simulation use and to identify common viewpoints of those who had experienced simulated learning in their nursing education. The sample consisted of 24 students from 17 Ontario colleges and universities. Most students (89.2%) were in their third or fourth year of undergraduate study, and all had experienced some exposure to low, medium, and high-fidelity simulators. Simulations were most often used to support clinical and theoretical courses and not used for replacement of clinical hours. Approval for the study was obtained from the McMaster University Ethics Board and from each participating university (Baxter et al., 2009).

Q-methodology was employed in this study. This methodology had been used in various health science research because results were not biased due to low sample size or low rate of response. Q-methodology mixes quantitative and qualitative methods with a
primary objective to identify a typology and not testing the typology's proportional distribution within the larger population. The test-retest reliability of Q-sorting had been cited as 0.80 or even higher (Baxter et al., 2009).

The researchers reviewed data from another study which was part of the larger research project. The data was collected from focus group production of statements about the use of simulation in nursing education. These statements were reviewed and 104 statements were compiled into one data set. No theoretical hypothesis or framework was involved so an inductive process was used to elicit a representative Q-sample. Six domains emerged from the statements. These included teaching and learning, access/reach, communication, technical features, technology set up and training, and comfort/ease of use with technology. Following an iterative consensus process and group meetings, a final set of 49 statements was obtained. These statements represented key ideas from each of the six domains about the use of simulation in teaching nursing students. After the tool was pilot tested by two volunteer students, minor edits were made for clarification (Baxter et al., 2009).

The randomly numbered final statements were sorted onto a Q-sort grid. Each statement was scored between minus four and plus four, with negative statements indicating disagreement. Construction of the grid was such that only two statements could be scored minus four and two statements plus four. Just three statements could be scored with plus 3, three with minus three, and so on. Detailed instructions were mailed to study participants and each Q-sort grid was completed independently by each student and returned. A short survey with questions pertaining to demographics and previous
experience with simulations was also completed and returned by each participant (Baxter et al., 2009).

Analysis was performed using the PQMethod 2.11 to identify groups of students with similar viewpoints. The centroid method was used for factor extraction and three members of the research team met to interpret the factors. Consensus was reached, and a name and description assigned to each viewpoint. Consents had been received from 34 students from 17 Ontario universities; however, just 24 students actually participated in the study. Four major student viewpoints emerged from the factor analysis of Q-sorts with principal component and varimax rotation (Baxter et al., 2009).

The majority (89.2%) of students in the study were in the third or fourth year of undergraduate study and had had some exposure to low, medium, and high-fidelity simulations; for the most part incorporated simulators were used to support theoretical and clinical courses and not for replacement of clinical placement learning experiences. Four major viewpoints were represented by 20 of the 24 participating students who loaded significantly on the four representative factors (Baxter et al., 2009).

Factor one students were the reflectors and were composed of five students. These were the students who looked back on their experiences with technology and reflected on their actions and experiences. They believed that awareness of their ability was increased by simulation and that they had been made cognizant of their strengths and weaknesses by working with simulations. They could improve skills and knowledge before working with live patients and their anxiety in working with live patients would be minimized. This group did not believe that capabilities of mannequins were not utilized because of lack of programming knowledge or prohibitive cost. They also rejected the ideas that they
had to line up due to resource deficits or that there was insufficient time for learning (Baxter et al., 2009).

Factor two was defined by six students who were referred to as the reality skeptics. Though they felt that self awareness of abilities could be increased by simulation, they did not think the real clinical world could be replaced by simulation. They considered simulated patients to be "dummies" or "dolls," and that it was difficult to learn interpersonal skills with them. They also thought that learners were not as careful with the simulated patients as they would be with live patients. They expressed not having adequate time to work with simulators because of line-up issues, and that simulation did not increase their independence or confidence in the clinical setting. The researchers noted that this finding was contrary to most prior literature. Possibly because the reality skeptics did not embrace learning with simulators, they were more stressed by the experience, and, therefore, less self-confident (Baxter et al., 2009).

Factor three students were called comfort seekers; this group, comprised of four students, valued learning that provided them with comfort and was not stressful. They considered the completion of pre-set scenarios to be very stressful and that they had to get into a particular mind set to be comfortable with the simulations. They also thought that nursing students were having insufficient contact with real people for learning. Conversely, they disagreed that more academic preparation was needed before using the mannequins. After working with a mannequin, however, they reported not feeling confident enough to be independent in the clinical environment. The researchers concluded that additional exposure to technology might result in increased comfort for this group (Baxter et al., 2009).
Factor four, the technology savvies, was defined by five students. This group enthusiastically embraced technology. Though they did not see mannequins as being realistic, they could envision themselves in the hospital setting. They believed they were pretty technologically savvy and would have liked to make up their own scenarios and test each other. They also believed that the mannequins were not used to capacity because of prohibitive costs or lack of programming knowledge. They believed they could perform independently on the clinical unit after mastering a skill with a simulator, and that no additional academic preparation was needed before using the mannequin. The researchers reported on previous research which was in line with this finding. Prior research confirmed high-fidelity simulations promoted active learning in a safe environment and increased confidence in clinical skills for second year undergraduate nursing students (Baxter et al., 2009).

Baxter et al. (2009) reported areas of consensus of all four groups of students. Student participants disagreed that simulations were good because of clinical unit nurses not being helpful to students. They disagreed also that simulators experienced frequent breakdowns, caused frustration, and that repairs were not accomplished in a timely fashion. All participants felt that though simulations are not as realistic as the actual clinical setting, students could become acclimated to correctly doing skills by utilizing simulators. Participants also believed that they did not need to manipulate mannequins before using them to learn, and did not feel strongly that faculty not comfortable with simulation should be required to use it.

The exploration of the perceptions of nursing students and the use of technology for clinical simulations yielded results varying from excitement and enthusiasm to those
who wanted to use it only if anxiety and discomfort could be avoided. However, this study found that the majority of students were willing to use technology. The researchers concluded that educators must be aware of how both students and faculty perceive the use of technology for clinical simulations and to make sure that the unique learning needs of the student population are met. Adequate time, resources, and attention to the adoption of new simulation technology is paramount. The researchers also suggested that pairing comfort seekers with technological savvies and reality seekers with reflectors could help ease reluctant students into the use of technology (Baxter et al., 2009).

This study was important because a student's beliefs regarding technology may impact how it is utilized and also because it was one of the first studies using Q-methodology to look at the feelings and perceptions of students regarding the use of simulation. Baxter et al. (2009) cited some limitations to the study. Due to time and funding, more schools of nursing were not included in the study. Sometimes when students described their beliefs, it was unclear if they were referring to one or two types of simulation or all simulation. Some schools have also just begun simulation, so students expressed their opinions on very limited experience. The researchers also found it unclear as to how much time students from various schools had had time and opportunity to engage with equipment. The style of implementation by faculty may have influenced students, and lastly, the knowledge of faculty on the capabilities of simulators and how much they were used may have impacted the perceptions and experiences of students.

The researchers concluded that due to the financial investment in simulations by the Ontario government, simulations would continue to be implemented in the curriculum. Students were overall positive about the integration of simulation into their
nursing education. There were, however, differences among the four identified groups of students described as reflectors, reality skeptics, comfort seekers, and technological savvies. Baxter et al. (2009) suggested that it was important for educators to understand these differences so student learning can be supported as technology becomes an increasingly major component of nursing curriculum.

*Faculty and Student Perception of Simulation Use in Education*

In a descriptive study, Feingold, Calaluce, and Kallen (2004) examined the evaluation of clinical simulated experiences by baccalaureate students and faculty. The researchers described that clinical simulations had historically been used for medical education and had now become commonly used in nursing education as well. It was hypothesized that critical thinking skills in students might be promoted by active involvement with realistic clinical simulations and that clinical simulations would evaluate students' competence in areas of assessment, communication, decision making, and psychomotor skills. The framework used for the research study was Knowles' Theory of Andragogy.

The purpose of the Feingold, Calaluce, and Kallen (2004) study was to clarify and evaluate the perceptions of both students and faculty about using "SimMan," the computerized high fidelity patient mannequin, for teaching and assessment. SimMan was used during simulated clinical scenarios.

The population for the study was two groups of senior baccalaureate students enrolled in the course, Advanced Acute Care of the Adult. The fall 2001 group had 50 students and the spring 2002 group had 47 students. Four full-time faculty members were the faculty participants in the study. Three of the faculty taught the Advanced Acute Care
of the Adult course and the fourth taught in the Intermediate Acute Care of the Adult course (Feingold et al., 2004).

Each student group participated in two faculty-designed simulated patient scenarios using the critical-care area of the school's Patient Care Learning Center. The mannequin, "SimMan," was programmed by faculty to simulate two patient scenarios with deteriorating conditions; a 65-year old female with COPD was one of the scenarios. SimMan was programmed to vocalize pre-programmed phrases and support hemodynamic monitoring, an IV, chest tubes, a tracheotomy and other invasive procedures of the study. Each student received a verbal report from a faculty member and a list of laboratory values and physicians' orders. The student was instructed to lead the healthcare team, prioritize problems, and communicate with the patient and his family. Students were scored by faculty using an instructor-developed checklist and were then provided with immediate feedback (Feingold et al., 2004).

The questions the students were asked regarding the value of the simulations consisted of 20 items which were related to the ability to apply skills learned in simulation to a real world clinical scenario, the authenticity of the simulation and the overall value of the simulation. Student responses were rated using a four-point Likert scale with choices made from four-strongly agree to one-strongly disagree. Three areas of the survey were summarized using subscales. Those areas were realism, with four survey items, transfer, with three survey items, and value, with six survey items. The seven remaining items were listed individually (Feingold et al., 2004).

Sixty-five of the 97 students enrolled in the study responded to the survey. More than two-thirds (69.3%) of the students considered the simulations a valuable learning
experience, and 76.5% believed the simulations enhanced learning. The experience was an adequate test of clinical skills according to 83% of the students, and 87.7% agreed that the simulations successfully evaluated decision-making competency. However, just 46% of the students believed the simulations increased their confidence or clinical competence, and just 54.7% agreed that the simulation prepared them to function in a genuine clinical environment (Feingold et al., 2004).

Faculty used the same four-point Likert scale to respond to a 17-item survey. The faculty survey included items regarding the need for faculty support and training regarding the new technology. Results showed that all faculty members believed the clinical scenarios were realistic recreations of an acute care clinical setting. All faculty also thought that students were being prepared to function in an actual clinical setting by completing the scenarios. Also, 100% of the faculty members believed that SimMan was an effective teaching tool. On the negative side, most faculty members believed that using SimMan required extra preparation time. They also believed that because faculty support was inadequate, this technology would not be optimally used (Feingold et al., 2004).

All survey results were analyzed to obtain survey and item descriptive statistics. Included were mean, standard deviation, and frequency and percentage of responses of the students. Feingold et al. (2004) also performed two-tailed, independent groups t tests to determine if self-reported GPA effected the students' level of responses. There were no statistical differences. ANOVAs indicated no statistically significant differences in student responses except for the question regarding the realism of the pace of the clinical
simulation. Statistically significant differences existed between students 22 years old or younger and those 23-30 years old.

Feingold et al. (2004) concluded that simulated clinical scenarios using a computerized patient model can be valuable for both students and faculty. The majority of students believed that the simulations were realistic. Anecdotal data from faculty suggested that actual clinical performance of students could be predicted by their performance in the simulations. Faculty unanimously believed that experiences with simulation helped students to perform well in real clinical situations. However, many students did not believe that simulated practice prepared them for actual clinical situations. Students were not willing to participate in a planned qualitative interview which included comparison of performance on simulations and actual clinical scenarios and analysis of clinical grades. This posed a limitation to the study. The researchers concluded that, while simulation can never replace actual clinical experience, it could help fill clinical gaps and use technology to help maximize clinical experience and help prepare future nurses.

Dillard, Sideras, Ryan, Hodson-Carlton, Lasater, and Siktberg (2009) reported on a collaborative project across institutions to apply and evaluate Tanner's Clinical Judgment model through simulation. Purposes of the research study included the examination of the effectiveness of a faculty development workshop focused on evaluating students' clinical thinking during simulation, the evaluation of student learning after one simulation case, and the investigation of the perceptions of students and faculty regarding the impact of a simulation session on actual clinical practice.
In the review of the literature, the researchers found evidence that the use of high fidelity simulation improved educational outcomes for medical students. The literature also indicated nursing students reported that simulation positively affected their confidence in clinical situations (Dillard et al., 2009).

Tanner's Clinical Judgment Model was the framework for this study. Four dimensions of clinical judgment were identified in the Clinical Judgment Model: noticing, interpreting, responding, and reflecting. Tanner's model depicted expected clinical judgment of experienced nurses and provided guidance for faculty and students in working toward growth and learning. In this study, Lasater's evidence-based rubric with 11 indicators of clinical judgment was used. Student expected behaviors in the beginning, developing, accomplished, and exemplary levels was described. An earlier 2008 study provided evidence of the rubric's construct validity which supported the ability of faculty to distinguish levels of student performance in simulation (Dillard et al., 2009).

In this study, two schools of nursing worked together for the purposes of: providing faculty development regarding the evaluation of students' clinical judgment, incorporating a simulation scenario requiring clinical judgment with subsequent student and faculty evaluations, and discovering faculty and students' perceptions of the application of learning from the simulation lab in the clinical setting. Two faculty with expertise in the application of Tanner's Model of Clinical Judgment and Lasater's Clinical Judgment Rubric facilitated an initial faculty development workshop prior to the study implementation (Dillard et al., 2009).

A sample of 68 students enrolled in a junior adult health class and their instructors participated in a simulation featuring a patient with heart failure. There were six learning
objectives for the simulation. The students encountered an anxious, dyspneic patient lying flat with a disengaged nasal oxygen cannula. The simulation and debriefing lasted 15 minutes in which students were expected to first notice, interpret, and respond to the patient's respiratory distress and then educate the patient in accordance with notice cues given. After the debriefing, a self-assessment focusing on the goals and objectives of the simulation was completed by each student. Faculty contributed by being the voice of the patient and also had multiple opportunities to observe, debrief, use the rubric, and evaluate students. A subset (n=25) of students participating in the study were assigned to a cardiovascular unit for the final stage of the project (Dillard et al., 2009).

Implementation of workshop objectives was the expected outcome of the faculty development. The Cervero Model provided the framework for faculty development evaluation of this research. Six subscales were used for faculty development evaluation: work environment, motivation related to change in nursing education, educational program in relation to change, education offering in relation to clinical judgment and clinical simulation, instructor presentation, and faculty self-evaluation about the application of the Clinical Judgment Model and Clinical Judgment Rubric. A five-point Likert scale (1 = strongly disagree, 5 = strongly agree) was used to score a 40-item questionnaire with reliability of the instrument reported as \( r = .94 \) (Dillard et al., 2009).

A mean for each subscale was used to report faculty evaluations. Faculty saw organizational environment as being encouraging, flexible, and rewarding (\( m = 4.3 \)) and motivation for continuing to enhance student learning and implement changes in teaching strategies as exciting (\( m = 4.7 \)). Changing the educational program (\( m = 3.9 \)) was dependent upon the nature of the change. Using the Tanner Model and Lasater Rubric to
help evaluate student performance during simulation was seen as understandable and doable by faculty; faculty believed the teaching session on clinical judgment was presented in a well organized manner and rated themselves as competent (3.0) on a novice-to-expert scale. The authors rated the overall experience as being positive and worthwhile (Dillard et al., 2009).

Six identified objectives governed expected learning for students \( n = 68 \) who responded that they "mostly" or "totally got" all concepts. Concepts were specific to heart failure and included effect of body position in breathing \( (m = 3.81; sd = 0.5) \), value of fluid status to interpret patient status \( (m = 3.63; sd = 0.64) \), impact of and responses to patient anxiety \( (m = 3.72; sd = 0.60) \), importance of adherence to drug treatment plan \( (m = 3.51; sd = 0.72) \), use of lab values \( (m = 3.12; sd = 0.82) \), and communication of complex information to patients \( (m = 3.51; sd = 0.68) \). (Dillard et al., 2009).

Clinical judgment ability was revealed in students' journals. For instance, one student was able to identify a deviation from normal when radial pulses were very weak, but did not know to assess the apical heart rate. No mention of breathing, blood pressure, mental status, renal function, or activity level appeared in the journal. This student was incapable of focusing on more than one thing at a time so, according to the Lasater Rubric, was functioning at the beginner's level of noticing. In another student's journal, basic assessment data was missing. A student caring for a patient having an order to go from a 40% oxygen mask to a cannula at 6L./minute responded to her patient's shortness of breath by elevating the head of the bed and then consulting with the nurse and respiratory therapist. This response was appropriate and was categorized by the rubric as a developing level of clinical judgment. Some students, in their reflective journals, were
concentrating on getting tasks done instead of analyzing data and thinking like a nurse. In such cases opportunities to learn to make clinical judgments and critically think are lost (Dillard et al., 2009).

The researchers concluded that this study was enlightening for students and faculty alike. The faculty development workshop was considered helpful. However, the researchers recommended for long term change in applying the clinical judgment framework to clinical and simulation experiences, both faculty and students needed practice and encouragement (Dillard et al., 2009).

The data indicated that students actively engaged in the simulation learning process left the experience feeling they had understood its concepts. The researchers concluded that much could be identified about students' clinical judgment abilities from reading the journal reflections. The researchers concluded that faculty could shape future learning activities to target knowledge and practice deficits or guide the student toward more complex clients through such reflections (Dillard et al., 2009).

The researchers concluded that neither standardized curriculum for simulation use nor standardized method for student evaluation in simulation had yet been developed. Faculty development and training must be a priority if simulation is to be integrated into nursing curricula. Orientation to the Tanner Clinical Judgment Model and the Lasater Rubric provided a new framework for faculty and students. To effectively continue to connect the simulation to clinical practice, the researchers recommended the clinical judgment framework must be further integrated into didactic and clinical assignments (Dillard et al., 2009).
Concern regarding clinical competency of graduating nursing students has been an issue in the United Kingdom (UK) as well as in North America. The Nursing and Midwifery Council (NMC) have been scrutinizing how students learn skills. Adequate "clinical placements" have been difficult to obtain in Britain in recent years. London South Bank University, where the researchers were associated, became one of the NMC's sites for its Simulation and Practice learning pilot projects (Baillie & Curzio, 2009).

In preparation for their research study, Baillie & Curzio (2009) conducted an extensive review of the literature related to the implementation and evaluation of simulations. Areas included in the review included the overview of the definition and differentiation of the various types and use of simulators; such as static, low, medium, and high fidelity simulators as well as the use of virtual reality systems. The researchers also reviewed many studies of simulation related to student perceptions toward the simulation experiences. Findings from a variety of studies which spanned nearly two decades included such student perceptions from the use of simulation as decreased anxiety, increased confidence, enhanced patient safety, and the linking of theory and practice. Other studies, however, revealed conflicting results. For example, some nurse educators questioned the transferability of skills learned in the laboratory to use in actual clinical placement. Studies also yielded varied results regarding skills laboratory practice and performance in the actual clinical setting. In fact, another study by Freeth & Fry did not support patient safety as a benefit of learning in the skills laboratory (Baillie & Curzio, 2009).

From their review of the literature, Baillie & Curzio (2009) concluded that most studies evaluating simulation related to the perceptions of students had been small sample
sizes but positive in perceptions by students of the value of simulation to increased learning.. Their literature review, however, did reveal an area of research needing further investigation. None of the reviewed research had measured the effect of simulation on actual clinical practice (Baillie & Curzio, 2009).

Baillie & Curzio (2009) explored the comparison between learning at the actual clinical site and learning with a simulation component replacing some of the actual clinical hours. Additional information requested by the NMC was also targeted, including how simulation contributed to practice learning and the development of national simulation standards.

The study had the following four goals. Goals included: evaluation of the simulations by students and facilitators, students' perceptions of the impact of the simulations on clinical practice, perceptions of the benefits of simulations to clinical practice from the viewpoints of students and facilitators, and comparison of the clinical preparation, confidence, and performance of students who did experience simulations with those who did not (Baillie & Curzio, 2009).

Two-hundred and sixty-seven nursing students were divided into 12 sub-groups for clinical placement. Simulation was a component of the clinical experience for eight sub-groups, totaling 179 students. The remaining 88 students (4 sub-groups) did not have a simulation component as part of their clinical placement. These were the comparison groups for four clinical sub-groups. No comparison groups' data were available for the other four sub-groups (Baillie & Curzio, 2009).

The Jeffries' Nurse Education Simulation Model was used by faculty and staff to plan seven sub-group programs. Planning included the interaction of students, facilitators,
and education practices. Five days of simulation experience were implemented. Students undertook simulation either at the beginning of the clinical course or at planned intervals during the course, depending on the approach chosen by the program developers. Students role-played patients; low fidelity models and manikins were used for simulation. Available was an extensive array of up-to-date and cutting-edge medical equipment and supplies. Skills practiced were grouped into three categories: physical care, communication, and management. Examples of skills rehearsed included naso-gastric tube insertion, medicine administration, interviewing skills, care planning, and clinical decision-making. Except for a learning-disability group, students used empty hospital units as a setting for the simulations (Baillie & Curzio, 2009).

The evaluation process was managed by a project steering group composed of senior faculty, NHS representatives, and a project working group, made up of faculty and NHS staff who had run the simulation programs or had been involved with the study doing unspecified tasks. The pilot sites were required to complete NMC's common evaluation tools at the end of the project. The University's Ethics Committee approved the questionnaire and study protocol and participating students signed consents after receiving verbal and written information about the study and being assured their responses would be kept anonymous (Baillie & Cuzio, 2009).

Each simulation group student completed a questionnaire before beginning the simulation about the simulation program. After the end of the clinical course, each simulation group student completed a questionnaire regarding the application of learning in the actual clinical setting. The control group students completed questionnaires at the end of the clinical course about how prepared and confident they had felt for clinical
skills performance. Responses were analyzed by faculty not involved in the operation of
the simulation program and not responsible for assessing the students. The data was
analyzed with descriptive statistics using SPSS v13. Appropriate associations were
examined using chi-square. Facilitators from each sub-group jointly completed a
questionnaire regarding the program and a simulated learning environment audit. These
were analyzed manually with qualitative data and open comments thematically analyzed
(Baillie & Curzio, 2009).

Not all participating students returned questionnaires but response rates were
reported for the sets of data presented. Satisfaction was expressed by most students with
the simulated learning environment. Included with this was satisfaction with resources,
levels of supervision, and relevance of the simulations to the program. All sub-group
facilitations reported that resources were adequate or adequate to some extent (response
was influenced by size of group). All facilitators agreed that simulation programs were
evidence-based, that students were adequately supervised when practicing skills, and that
simulation helped students reach their learning outcomes. Students expressed high
satisfaction with supervision received. (Baillie & Curzio, 2009).

Less satisfaction was expressed by both students and facilitators with time
available for skills rehearsal. Five sub-group facilitators reported sufficient time for skills
practice with the remainder reporting sufficient time "to some extent." Just 60%
(n=101/169) of students believed sufficient practice time had been provided, with 28%
(n=48/169) responding they had sufficient practice time "to some extent." All facilitators
stated that students were given adequate feedback during the simulation with 95%
(n=150/158) of students reporting being satisfied or satisfied "to some extent" with
feedback received. A few students expressed the desire for more regular and immediate feedback (Baillie & Curzi, 2009).

Benefits of simulation identified by facilitators included team working, opportunity for environmental familiarization, opportunity to practice skills correctly, and practice with advanced communication techniques. Also, students could practice skills not frequently encountered in their clinical placements. Most students, 74% (n=100/136), did not feel that spending the time at the actual clinical site would have been more valuable than the simulations (Baillie & Curzio, 2009).

At the end of the clinical placement, students in stimulation groups remained positive regarding their experiences; most considered their simulation learning relevant and believed the simulation program had increased their confidence with clinical skills. However, just 47% (n=66/141) of simulation students felt well-prepared with clinical skills. An additional 45% (n=63/141) said they felt prepared to some extent. When comparison group students were asked how prepared they felt with clinical skills, no statistical chi-square result was shown. Many students did, however, write positive comments about the simulation experiences helping prepare them for the performance of clinical skills (Baillie & Curzio, 2009).

This first-time study comparison of undergraduate nursing students, all with a clinical practice placement, and some with and some without an incorporated simulation program indicated no disadvantage to replacing a limited number of clinical hours with simulation experience. This study focused on low fidelity simulation models. Students and facilitators alike identified many benefits of simulation. Confidence was increased and actual ability to perform skills was enhanced. Many students and facilitators
perceived a benefit of simulation to be the opportunity to practice and make mistakes without harming patients. The findings of this project, when reported to the NMC, resulted in a recommendation for incorporating simulation into undergraduate nursing programs in the UK. Students believed they benefited from simulation but also from hands-on clinical experience. Actual impact of simulation upon clinical performance is a key aspect still to be confirmed (Baillie & Curzio, 2009).

Summary

New graduate nurses often are unable to function acceptably in the complex and fast-moving health care environment. Insufficient clinical experience has caused them to be deficient in both critical thinking and technical skills. Employers do not have the time and financial resources for the remediation necessary to render them functional. Clinical simulation is one method to fill in the gaps between theory and practice. The purpose of this descriptive study is to evaluate the perceptions of undergraduate nursing students and faculty related to the experience of using "SimMan," the computerized high fidelity patient mannequin for teaching and assessment during simulated clinical scenarios. This is a replication of Feingold, Calaluce, and Kallen's 2004 study. Knowle's Theory of Andragogy provides the theoretical model of adult learning reflected in the conduction of clinical simulations (Feingold et al., 2004).

Knowles believed that adults have a problem-centered frame of mind toward learning. They view education a way to assist them in dealing with current life problems. Their perspective toward learning is one of immediacy of application (Knowles, 1970, p. 48).
This particular orientation to learning has several implications for the technology of Andragogy. The adult educator must be primarily attuned to the learning needs of the students and be able to design learning experiences to address their concerns. They function as facilitators of learning rather than purveyors of subject matter. Because adult learners are problem-centered, problem areas are the appropriate milieu for learning. Knowles believed that the face-to-face interaction between teacher and a group of students was the most critical element in any adult education program. Knowles premised his Andragogical approach to teaching and learning on three assumptions. The first assumption was that adults can learn. Secondly, Knowles believed that learning is an internal process. The third assumption was that there are superior conditions of learning and principals of teaching. (Knowles, 1970, p. 50-53).

Knowles advocated responsibilities for both learners and teachers. He believed that the learner shared responsibility for the planning and operation of the learning experience and the active participation in it. The teacher was expected to expose the student to new possibilities for self-fulfillment, identify life problems the student was experiencing because of gaps in personal equipment, and provide comfortable physical conditions conducive to learning (Knowles, 1970, p. 52-53).

The role of the faculty member in clinical simulation is that of a facilitator. Clinical simulation is interactive, builds on prior knowledge, and addresses real clinical problems. Clinical simulation is consistent with Knowles' Theory of Andragogy (Feingold et al., 2004).

The literature review was divided into three sections. The first section included studies related to the faculty perception of simulation use in education. These explored
the views of nursing faculty and non-university health care providers and educators toward the use of simulation in education. They also sought to identify obstacles perceived by faculty to the use of simulation. The second section surveyed student perception of simulation use in education and examined the correlation of learning styles and student satisfaction with high-fidelity simulation. Students were also surveyed to determine if they believed simulation had improved their skills, and if they considered simulation an effective learning tool. The third section explored studies of both faculty and student perception of simulation use. Negative and positive perceptions were surveyed.

Faculty Perception of Simulation Use in Education

Twenty-five self-selected faculty from five Wisconsin Technical College System and five University of Wisconsin nursing programs comprised the sample in the 2009 study by Jansen et al. The study employed a qualitative, descriptive design with an empiric analytical technique for content analysis. Some level of manikin-based simulation was being used in courses taught by 72% of the faculty. A survey was developed by Jansen et al. with eight closed-ended descriptive items and an open-ended item. Survey information was used to help research team members in preparing activities targeting the learning needs of the faculty in regards to manikin-based simulations. The research team reviewed all responses with the result of the creation of seven categories of obstacles. The categories were time, training, not applicable/attitude, lack of space and equipment, problems scheduling lab, staffing, funding, and engaging students not involved in simulations while classmates were performing simulations. Time and training were the most cited obstacles. The researchers proposed a number of solutions to
minimize identified obstacles. However, the researchers indicated that further research must be done to determine the effectiveness of the proposals. Findings from this study suggested that educators needed to be aware of creative and frugal ways to integrate manikin-based simulation into their courses.

The purpose of the Akhtar-Danesh et al. (2009) study was to explore nursing faculty members' views about simulation in nursing education. The focus groups involved in this study were 37 faculty members, each with at least five years of teaching experience, from four colleges and three universities in Ontario. The researchers used an inductive process to produce a representative Q-sample from the data set drawn from 104 statements of the focus groups. Six major categories emerged from the aggregate statements. The research team refined the statements within each category and arrived at a consensus on the most appropriate use of the statements. The 43 statements represented key ideas from each category regarding the use of simulation in nursing education. Study participants sorted randomly numbered final statements and scored each statement between -4 and +4. Four major viewpoints describing four groups of faculty emerged from the factor analysis of q-sorts. The viewpoints were positive enthusiasts, supporters, traditionalists, and help seekers. The researchers concluded that, overall, simulation was perceived by nursing educators as a valuable tool to support learning for students, but not one that can replace "real-life" clinical learning. Few negative voices were heard in this study, but many faculty believed simulation required additional support of time required to used this modality in teaching and additional human resources for its support.

The 2009 study by Bray et al. surveyed non-university healthcare educators and providers and university health sciences faculty's attitudes toward the integration of
human patient simulation (HPS) technology into curricula. The purpose of the study was to gauge the interest and attitudes of potential HPS users in healthcare disciplines other than nursing to determine if common ground for interdisciplinary collaborative HPS programs exist. Major themes examined focused on the role of HPS in clinical skill development, learning, and evaluation of student learning. Community forum informational sessions were held by the researchers over a three month period. The healthcare disciplines of pharmacy, nursing, physical therapy, emergency response, dentistry, exercise science, and speech and hearing science were all represented at the forums. Survey items were developed and refined by experts in HPS or research methodology. Closed-ended items asked respondents about demographics and previous experience with HPS. Also contained was a three-point response scale asking if addition of HPS to curriculum would enhance specific clinical skills in learning and practice, skill assessment, or teaching. The degree of concern with common barriers to HPS implementation was also surveyed by the use of a four point scale. The researchers concluded that valuable information about the perceptions educators have about successful adoption and perceived barriers of HPS technology in healthcare learning was obtained in this study as well as perceived barriers to its successful adoption. Responses did not significantly differ from university and non-university affiliated educators except in the area of communication. Collaboration for development or maintenance of HPS programs bodes well because of this commonality of responses. Greatest concerns expressed were the high cost of technology, inadequate training, and the increased workload for faculty.
Fountain and Alfred (2009) explored the correlation of learning styles with student satisfaction in the use of high-fidelity human simulation in a baccalaureate nursing program. Categories identified included linguistic intelligence, spatial intelligence, interpersonal intelligence, kinesthetic intelligence, and logical/mathematical intelligence. The sample was 104 baccalaureate nursing students from three campuses of one school of nursing. All students were in their advanced medical-surgical course and participated in a simulation enhanced learning activity during a campus laboratory period. The same high fidelity simulation (HFS) enhanced cardiac case scenarios were used at all three campuses. After completing the three hour lab session, students completed the National League for Nursing (NLN) Student Satisfaction and Self-Confidence in Learning Scale. The scale had 13 items with responses measured on a five-point Likert-type scale. Findings from the study were correlated with the nurse entrance exam students had taken as part of the school's admission criteria. Results indicated that both students with social and solitary learning style preferences were satisfied with this HFS-enhanced learning experience. Student satisfaction did correlate with learning styles. The experience was beneficial to the social learners because they compared, listened, and interacted with others. The solitary learners observed, reflected, and completed self-paced projects. The researchers reflected it was exciting and gratifying for faculty to be able to engage students with different learning styles in the same HFS activities with resulting student satisfaction.
Schoening, Sittner, and Todd (2006) implemented a nonexperimental pilot evaluation study to identify and refine simulation learning activities, learning objectives, and student perceptions of the experience. A scenario of preterm labor was developed by the researchers for this simulated clinical experience (SCE). The study was conducted at a private Midwestern university where six hours of clinical time were replaced with a high-fidelity simulation. Sixty baccalaureate nursing students in the second semester of their junior year comprised the sample. The SCE occurred in the last two weeks of the students' high-risk obstetrical rotation. The clinical instructor functioned as the facilitator of the SCE. This learning activity was divided into Joyce and Wiel's three phases of orientation, participant training, and simulation operations. The performance was videotaped and projected to an observation group of students in a separate room. The observation group evaluated the performance of their peers and developed a written care plan for the "patient." Joyce and Weil's phase four of the learning activity, debriefing, followed the completion of the scenario. At the conclusion of the second week, students completed a confidential 10-point evaluation of the SCE which had been developed by the faculty who authored the SCE. A four-point Likert scale was used to determine if students believed they had met the objectives for the SCE and if they believed the SCE had improved their skills, increased their knowledge of preterm labor, or increased their confidence in the clinical setting. Descriptive analysis was used to analyze data and aggregate data was categorized. Qualitative data indicated that students had been allowed opportunity for hands-on learning and practice during the SCE, and that simulation allowed them to go to the client's room with increased confidence and comfort. Observer group students expressed satisfaction and believed the SCE had value and transferability.
The purpose of the study was realized with results suggesting that as new nurses begin to use high-fidelity simulation, Joyce and Weil's four-phase teaching method may serve as an effective guide as SCE is implemented as an instructional method.

Bambini, Washburn, and Perkins (2009) used a mid-sized college of nursing in a Midwestern state as their setting for a study to evaluate the effectiveness of simulated clinical experiences as a teaching/learning method to increase the self-efficacy of nursing students during their first clinical course of a baccalaureate program. Baccalaureate students in their first semester of clinical nursing comprised the sample of 112 students. The study took place over a period of four semesters. Students completed three surveys on a volunteer basis: a pretest (before the simulation), a posttest (after the simulation), and a follow-up survey (after the first clinical day). The posttest and follow-up surveys each also had three open-ended questions. The surveys were each color-coded and numbered so pretest, posttest, and follow-up surveys could be matched. Because only 20 students completed the follow-up survey, it was not analyzed. The surveys were designed with six questions to measure students' self-efficacy before simulation, after simulation, and after the first actual clinical day. A 10-point scale as used to answer each question. Higher scores indicated higher self-efficacy. The first question explored if the simulated experience increased self-efficacy of students prior to practicing in the obstetrics clinical setting. Findings indicated a significant increase in students' confidence for skills addressed except for performing a breast exam or measuring vital signs. Answers to the open-ended questions were analyzed by the researchers and categorized. The second research question concerned the students' perceptions of the simulated clinical experience. Qualitative findings suggested that students found the simulations to be a
valuable experience in which their confidence in what to expect and how to conduct themselves in the clinical setting was increased. The researchers concluded that realistic simulations as a teaching tool have become much more feasible in recent years with the advancement of technology. Findings from this study suggested that clinical simulations have a positive effect on the self-efficacy of students.

Sinclair and Ferguson (2009) studied the integration of simulation in a nursing theory course to access students' perceptions of self-efficacy for nursing practice. Two research questions were considered in this study. The first question focused on what effect of an educational strategy that combines classroom and simulated learning activities would be on students' perceptions of self-efficacy for nursing practice. Secondly, what was the effect of an educational strategy that combined classroom and simulated learning activities on students' satisfaction, effectiveness, and consistency with their learning styles with the interventions? The sample was 250 nursing students enrolled in a collaborative baccalaureate program at two delivery sites of an urban university in southwestern Ontario. Students at one site were the intervention group (n=125) and those at the second site were the control group (n=125). This study utilized a course focused on episodic health challenges across the lifespan. The course had a companion clinical course. Three lecture topics were chosen for this study: one in adult health, one in mental health, and one in child health. The control group received two hours of lecture on each topic. The intervention group had one hour of lecture and one hour of simulated learning activity on each topic. A demographic questionnaire was completed by all students. Both groups also completed Baccalaureate Nursing Student Teaching-Learning Self-Efficacy Questionnaire which had been developed for pre- and
post-lecture or simulate learning activity. This tool contained 16 nursing practice behaviors. Students used a Likert scale to rate their perceived self-efficacy for each item. Satisfaction ratings showed that of the intervention group, 91% said the lecture/simulation learning activity was effective or very effective for their learning. Just 61% of the control group reported lecture only to be very effective or effective for their learning. Satisfaction with the lecture/simulation combination was 91% for the intervention group and satisfaction with lecture only was 70% for the control group. Consistency between combination lecture/simulation and learning style was 91%. Consistency between the lecture method and learning style for the control group was 76%. Findings for this study suggested that educational interventions of lecture only or a lecture/simulation combination were effective in increasing students' perceptions of self-efficacy. However, greater increases were shown in the intervention group with differences in ratings statistically significant for four of the five simulations.

Factors examined in the descriptive, correlational study by Smith and Roehrs (2009) were student satisfaction and self-confidence as outcomes of a high-fidelity simulation (HFS). In addition to the measurement of student satisfaction and self-confidence, this study examined the correlation between the components of student demographic characteristics and simulation design characteristics. This study was conducted at a school of nursing at a public university in the Western United States where 68 junior baccalaureate students in their first medical-surgical course were the sample. The high-fidelity simulation (HFS) related to the care of a respiratory patient. Students were divided into groups of four with two acting as nurses and two as observers.
The nurses conducted a physical assessment and administered medications and the observers recorded observations. The scenario lasted 20 minutes and was followed by debriefing and the completion of the research study instrument. A demographic instrument was designed by the researchers to describe the student sample and assess any correlation of demographic characteristics to the satisfaction and self-confidence of the students. The Student Satisfaction and Self-Confidence in the Simulation Design Scale (SDS) developed by the National League for Nursing (NLN) was also used in this study. Both instruments were self-reporting and used five-point Likert scales. Survey results suggested that students were satisfied with the HFS experience and that they were confident in their abilities to care for a respiratory patient. Findings from this study also suggested that nurse educators must carefully choose the design of any HFS experiences for nursing students. The two most significant design factors that emerged were objectives and problem solving. This suggested that nurse educators designing an HFS experience should have clear objectives and appropriate problem to solve.

Baxter et al. (2009) investigated the perceptions of nursing students regarding simulated experiences. The study was prompted by the government's purchase of simulation equipment for undergraduate nursing schools in Ontario as a potential remedy to the shortage of clinical placements for nursing students. The purpose of the study was to explore the perceptions of students toward simulation use and to identify common viewpoints of those who had experienced simulated learning in their nursing education. The sample consisted of 24 students from 17 Ontario colleges and universities. Most (89.2%) were in their third or fourth year of undergraduate study and all had experienced some exposure to simulation. Data was collected from focus group production of
statements about the use of simulation in nursing education. These statements were reviewed and 104 statements were compiled into one data set. Six domains emerged from the statements. These included teaching and learning, access/reach, communication, technical features, technology set up and training, and comfort/ease of use with technology. Following a consensus process, a final group of 49 statements was obtained which represented key ideas from each of the six domains about the use of simulation in teaching nursing students. A Q-sort grid with randomly numbered final statements was sent to each survey participant. Each Q-sort grid was completed independently and returned to the researchers. A short survey with questions pertaining to demographics and previous simulation experience was also completed and returned by each participant. Analysis was then performed to identify groups of students with similar viewpoints. Findings of this study suggested that students were overall positive about the integration of simulation into their nursing education. There were, however, differences among four identified student groups described as reflectors, reality skeptics, comfort seekers, and technological savvies Baxter et al. (2009) suggested that it was important for educators to understand these differences so student learning can be supported as technology becomes an increasingly major component of nursing curriculum.

**Faculty and Student Perception of Simulation Use**

In their 2004 descriptive study, Feingold et al. examined the evaluation of clinical simulated experiences by baccalaureate students and faculty. The purpose of this study was to clarify and evaluate the perceptions of both students and faculty about using "SimMan," the computerized high fidelity patient mannequin for teaching and assessment. Two groups of senior baccalaureate students enrolled in the Advanced Acute
Care of the Adult made up the sample. One group was from the fall semester and one from the spring semester for a total of 97 students. Four full-time faculty were also participants. Each student group participated in two faculty-designed simulated patient scenarios featuring "SimMan" with a deteriorating respiratory condition. After receiving a verbal report, physicians' orders, and lab values, the student was instructed to lead the healthcare team, prioritize problems, and communicate with the patient and his family. Students were scored by faculty using an instructor-developed checklist and were provided with immediate feedback. The questions the students were asked regarding the value of the simulations consisted of 20 items which were related to the ability to apply skills learned in simulation to a real world clinical scenario, the authenticity of the simulation, and its overall value. Responses were rated using a four-point Likert scale with choices ranging from strongly agree to strongly disagree. Faculty used the same four-point Likert scale to respond to a 17-item survey which included items related to the need for faculty support and training regarding the new technology. Survey results suggested that simulated clinical scenarios using computerized patient model could be valuable for both students and faculty. The majority of students considered the simulated scenarios realistic. Faculty unanimously believed that simulated experiences helped students perform well in actual clinical situations. However, many students did not believe that simulations prepared them for actual clinical situations.

Dillard et al. (2009) reported on a collaborative project across institutions to apply and evaluate Tanner's Clinical Judgment Model through simulation. Purposes of this study included the examination of the effectiveness of a faculty development workshop focused on evaluating students' clinical thinking during simulation, the evaluation of
student learning after one simulation case, and the investigation of the perceptions of students and faculty regarding the impact of simulation session on actual clinical practice. Noticing, interpreting, responding, and reflecting were the identified four dimensions of clinical judgment from the Tanner model. Two schools of nursing worked together in this study. A sample of 68 students enrolled in a junior adult health class and their instructors participated in a simulation featuring a patient with heart failure. Implementation of workshop objectives was the expected outcome of the faculty development. Faculty completed a 40-item questionnaire using a five-point Likert scale for scoring. Faculty believed the teaching session on clinical judgment was presented in a well organized manner and rated themselves as competent. Six identified objectives specific to heart failure governed expected learning for students. Students responded that they "mostly" or "totally got" all concepts. Clinical judgment ability was also revealed in students' journals. The researchers concluded that this study was enlightening for students and faculty alike. However, to effectively continue to connect the simulation to clinical practice, the researchers recommended the clinical judgment framework must be further integrated into the didactic and clinical assignments.

A 2009 study by Baillie and Curzio explored the comparison between learning at the actual clinical site and learning with a simulation component replacing some of the actual clinical hours. Additional information as requested by the Nursing and Midwifery Council (NMC) was also targeted. Goals of the study included: evaluations of the simulations by students and facilitators, students' perceptions of the impact of simulations on clinical practice, perceptions of the benefits of simulations to clinical practice from the viewpoints of students and facilitators, and comparison of the clinical preparation,
confidence, and performance of students who did experience simulations with those who did not. Two-hundred and sixty-seven nursing students were divided into 12 sub-groups for clinical placement. Simulation was a component of the clinical experience for eight sub-groups (179 students). The remaining four sub-groups (88 students) did not have a simulation component as part of their clinical placement. Each of the simulation groups had five days of simulation experience during which they practiced physical care, communication, and management skills. Each simulation group student completed a questionnaire about the simulation program before beginning the program. At the end of the clinical course, each simulation student completed a questionnaire regarding the application of learning in the actual clinical setting. The control group students completed questionnaires at the end of the clinical course about how prepared and confident they had felt for clinical skills performance. Study findings suggested no disadvantage to replacing a limited number of clinical hours with simulations. Students and facilitators alike identified many benefits to simulation.
Chapter III

Methodology

Introduction

Technology has revolutionized almost every academic discipline to some degree and is a major vehicle for the delivery of education. Nursing is no different from other disciplines, and technology, in more than one form, has become a major player in nursing education. Health care reform has brought changes to the hospital environment. There are fewer inpatients and those who are hospitalized are sicker. There are also increasing numbers of nursing students as schools move to address the nursing shortage and non-traditional students return to nursing school. This can translate into a less than optimal clinical experience for students, and students who graduate with too little hands-on experience in dealing with clinical crisis.

Simulations, though long used to some degree in nursing education, have become more integrated into the curriculum. Computerized mannequins have become increasingly sophisticated and able to mimic real-life scenarios. Although nothing can replace the reality of dealing with living and breathing human beings, simulations have been shown to assist students in learning to think on their feet in a non-threatening environment in which there is no risk for actual patient harm. Though student and faculty evaluations of simulation have been mixed, they have been positive for the most part. This study is a replication of the 2004 descriptive study conducted by Feingold, Calaluce,
and Kallen for the purpose of clarification and evaluation of the perceptions of both students and faculty regarding the use of "SimMan," the computerized patient model, for teaching and assessment. Presented in this chapter are the research questions, population, sample, setting, methodology, and procedures used in this study.

**Research Questions**

1. What are the perceptions of students and faculty members regarding patient and scenario realism with the use of SimMan?

2. What are the perceptions of students and faculty regarding the ability of the students to transfer knowledge from the simulated clinical experiences to actual clinical scenarios?

3. What are the perceptions of students and faculty regarding the value of the clinical simulation learning experience?

**Population, Sample, and Setting**

The population for this study will include associate degree students in their last semester of study who are enrolled in the Advanced Acute Care of the Adult at Northwest State Community College. The 50 students who will be enrolled in this course in the fall semester and the 47 in the spring semester will be eligible to participate in this study. Three full-time faculty members who teach the Advanced Care of the Adult course will participate in the study as well as one faculty member who will implement a scenario with some students enrolled in the Intermediate Acute Care of the Adult course.

**Protection of Human Subjects**

All documents related to this study will be submitted to the Institutional Review Board of Ball State University and the participating educational institution, Northwest
State Community College, and appropriate approval will be obtained prior to beginning the study. The study will maintain ethical standards for research. Participation will be voluntary and will not affect success in the course for students or employment for faculty. Informed consent will be obtained from each participant and confidentiality will be assured by the coding of data.

Procedures

After receiving approval from Ball State University and Northwest State Community College's Institutional Review Boards, participating students and faculty (fall and spring semesters, consecutively) will be contacted and the study explained by the researchers. The researchers will then meet with faculty who will be facilitating the simulation scenarios. A schedule for conducting the study will be established. Each student in the Advanced Acute Care of the Adult course will have two experiences with the patient simulator during this course. One experience will be at the beginning and one will be at the end of the semester. Faculty members teaching in the Advanced Acute Care of the Adult course will design two standard patient scenarios using SimMan in the critical care area of the Patient Care Learning Center (PCLC). The scenario will involve an elderly patient with exacerbation of chronic obstructive pulmonary disease (COPD) and pneumonia. After entering the test area, the student will receive a brief verbal report from the facilitating faculty member, and then receive a list of current laboratory values and physician orders for the patient. Vital signs and CO2 levels will be displayed on the patient's computerized cardiac monitor. Breath, heart, and bowel sounds, respiratory rate, peripheral pulses, and blood pressure will be evident when SimMan is assessed by the student. The laboratory will be equipped so SimMan can have IV therapy, oxygen,
continuous hemodynamic monitoring, suction, a chest tube, urinary catheter, nasogastric
tube, and tracheotomy. SimMan will also vocalize preprogrammed phrases and sounds
with the help of a remote control. Facilitating faculty will program a trend. During a 10-
minute period, the patient's condition will deteriorate with corresponding changes in vital
signs and hemodynamic values. During this time, the student will be expected to
prioritize problems, take action, and communicate with the patient, the patient's family,
and other members of the health care team. Scenarios will be slightly different for the
first and second simulations of the semester. For all scenarios, faculty will observe the
students' performance and provide immediate feedback.

Faculty will score students based on a checklist of critical behaviors and indicators of
clinical decision making. The researchers will utilize student and faculty survey tools to
solicit student and faculty feedback (Feingold et al., 2004).

Design

This study will utilize a descriptive design with a survey tool used at the end of
the fall and spring semesters with students who have interacted with SimMan for two
standard, simulated clinical experiences. A similar but separate survey tool will be used
to solicit faculty member feedback. There will be items regarding the need for faculty
support and training related to the use of the new technology added to the faculty survey
tool.

Instrumentation

The survey tool for students will feature 20 items related to the value of the
experience, the ability to transfer skills learned in the simulation scenarios to the real
clinical world, the realism of the simulation, and the overall value of the simulation
learning experience. Students will respond to each item by indicating the extent of their agreement with a Likert format. Choices will range from four = strongly agree to one = strongly disagree. The faculty tool will consist of a 17-item survey using the same four Likert-response options. Included will be items regarding the need for faculty support and training related to the simulation technology (Feingold et al., 2004).

*Intended Method for Data Analysis*

Descriptive statistics will be used in the conduction of data analysis of both student and faculty responses. Survey data will be analyzed to obtain the survey subscale and item descriptive statistics of mean, standard deviation, frequency, and percentage of student responses per response-option category. Also, two-tailed, independent-groups t tests will be performed for the purpose of determining if there are statistically significant differences between the level of students' self-reported GPA and their responses to the three survey subscales of realism, transferability, and value as well as to individual survey items not included in the subscales. Finally, analysis of variance will be performed to determine if there are statistically significant differences between or within students' self-reported age and their responses to the survey subscales and individual items not reflected in the subscales. An alpha level of .05 will be used for all statistical tests (Burns & Grove, 2009).

*Summary*

This chapter has described the methodology and procedures utilized in this study. The study replicates Feingold, Calaluce, and Kallen's (2004) study and will examine clinical simulations in regard to students' and faculty members' perceptions of simulated clinical experiences in regard to their realism, transferability of knowledge by students to
the actual clinical site, and the overall value of the learning experience. A descriptive comparison study design will be utilized with additional anecdotal data collection. Data will be collected, on a volunteer basis, from 50 first-semester and 47 second-semester associate degree students enrolled in an Advanced Acute Care of the Adult course, and four clinical instructions involved in the simulations. Surveys with Likert formats will be used to obtain the extent of student and faculty agreement. The faculty tool will also include items about the need for faculty support and training regarding the use of high-fidelity mannequins. Results from this study will add to the body of knowledge regarding the perceptions of students and faculty in regard to the value of the integration of simulations into basic nursing education programs.
References


Dillard, N., Sideras, S., Ryan, M., Hodson-Carlton, K., Lasater, K., & Siktberg, L. (2009). A collaborative project to apply and evaluate the clinical judgment model through simulation. *Nursing Education Perspectives, 30*(2), 99-104.


