Simulation in Nursing Education: a tool for Program Evaluation

Janet M. Withersty
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Simulation in Nursing Education: A Tool for Program Evaluation

Janet M. Withersty

Submitted to Loretto Heights School of Nursing

In Fulfillment of Doctor of Nursing Practice Degree

Regis University

April 1, 2012
Executive Summary
Simulation in Nursing Education: A Tool for Program Evaluation

Problem
High fidelity simulation as a clinical learning experience in nursing education in a rural setting was the area of interest in this outcomes research project. Schools of nursing provide the theoretical information for students but are challenged to provide practical hands on practice. Junior and senior student nurses at a rural school of nursing who lack adequate access to diverse clinical experiences served as the population for the study. High-fidelity simulation outcomes were evaluated using the Sweeney-Clark’s Rubric (2006, 2011) and Student Satisfaction and Self-Confidence in Learning Scale, developed by the National League for Nursing (NLN) (2005). Comparisons were made with each student serving as their own control using a repeated measure design to determine if there were changes in critical thinking, assessment, communication and nursing care interventions as a result of exposure to simulation pedagogies.

Purpose
This project evaluated the impact of high-fidelity simulation on communication, critical thinking, and assessment, nursing care interventions, satisfaction and self-confidence in a group of pre-licensure baccalaureate nursing students in a rural West Virginia School of Nursing.

Goals
The goal of this project was to assess changes in students’ self-confidence, critical thinking, communication, nursing interventions, and patient assessments scores across multiple exposures to high fidelity simulation. Additionally, a subset of students was evaluated in a clinical setting following their simulation experiences to evaluate transfer of these outcomes.

Objectives
Simulation experiences contributed to an increase of clinical experiences for students in rural areas. The objective for using high-fidelity simulation was to help improve the students’ core competencies (measured by the Sweeney-Clark rubric) and to show an increase in students’ self-confidence with the use of simulation (shown by scores on the NLN satisfaction/self-confidence scale). Students demonstrated improved outcomes in assessment, critical thinking, communication and nursing interventions through the use of repeated high fidelity simulation experiences.

Plan
Nursing students were recruited into the study at the beginning of the semester. Once enrolled in the study and having completed their informed consent, they completed a demographic questionnaire. All participating students were observed in the Nursing Simulation Laboratory at two different times (T1, T2); then twenty percent of participants were observed in the clinical setting (T3). Observers were trained for inter-rater reliability; r.94. Competency measures (critical thinking, communication, assessment, and nursing interventions) were rated. After each simulation experience (T1, T2, and T3), participants completed the NLN Student Satisfaction and Self-Confidence in Learning scale. Competence in these areas supported course/program evaluation.

Outcomes and Results
The findings showed improved scores on measures of communication, critical thinking, nursing assessment and nursing interventions following repeated exposure to high fidelity simulation. Students also reported high levels of self-confidence and satisfaction. Findings further suggest that there is crossover into the clinical setting. The outcome results suggested that simulation is an effective learning pedagogy in nursing education.
Acknowledgements

Through reflection, I have come to realize that I am very blessed and fortunate to have many wonderful people in my life who have been instrumental in both my graduate work, my growth and my life over all in the past several years.

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Finally I end by offering thanks to my wonderful children. You along with your Dad have taught me not to give up. I hope you can see from my efforts that dreams can really come true. I love you all very much.
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Simulation in Nursing Education: A Tool for Program Evaluation

Problem Recognition and Definition

The identified area of interest for this outcomes research project was high fidelity simulation as clinical experience within the nursing educational process in a rural setting. Teaching students in a rural setting poses many challenges regarding access to clinical sites. The high fidelity simulation experience occurs in a controlled environment in which students practiced safely and gained knowledge they might not receive in random learning experience in a clinical practice site.

This research project was undertaken in partial fulfillment of the requirements of the Doctor of Nursing Practice Degree at Regis University. The instruments used for this study will also become a part of overall program evaluation at West Virginia Wesleyan College (WVWC) School of Nursing through their use in embedded course assessment.

WVWC has begun to address the challenges of limited clinical placements in the rural area by providing two simulation experiences for each student per semester from sophomore year to senior year. These experiences were designed to provide students with opportunities to gain confidence in their clinical skills and assessment abilities. Faculty in the School of Nursing familiarized themselves with the literature on simulation experiences as adjuncts to clinical teaching. However, formal evaluations of these pedagogies in this setting have not been undertaken within the School of Nursing.

Problem Recognition and Definition

This project evaluated the impact of high-fidelity simulation on communication, critical thinking, assessment, and nursing care interventions in a group of pre-licensure baccalaureate nursing students in West Virginia School of Nursing (WVWC).
The research question was in the problem, intervention, comparison and outcome (PICO) format:

- **Population:** Underserved Bachelor of Science in Nursing (BSN) sophomore to senior student nurses at WVWC, a rural school of nursing who lacked adequate access to diverse clinical experiences with patients.

- **Intervention:** High-fidelity simulation experience using Sweeney-Clark’s Rubric (appendix A) and Student Satisfaction and Self-Confidence in Learning Scale (Appendix B), developed by the National League for Nursing (NLN), (2005).

- **Comparison:** Each student served as their own control using a repeated measure design to determine if there is a change in critical thinking, assessment, communication, and nursing care interventions as a result of multiple exposures to simulation pedagogies.

- **Outcomes:** BSN nursing students showed an improvement in scores on critical thinking, communication, assessment and nursing interventions (using Sweeney-Clark’s Rubric) and increased satisfaction and self-confidence as measured on the NLN Student Satisfaction and Self-Confidence in Learning Scale (2005).

  Expected findings of the study showed BSN students have improved scores on measures of communication, critical thinking, nursing assessment and nursing interventions following exposure to high fidelity simulation. To measure these outcomes the Sweeney-Clark Rubric was used during each simulation exposure.

  The Clark Rubric, (now known as Sweeney-Clark Rubric) “has been found to be a “practical tool” that can be easily used in all simulation scenarios (Gantt, 2010, p.101). The NLN Student Satisfaction and Self-Confidence in learning questionnaire evaluated satisfaction/self-confidence changes in relation to the simulation experiences. This project assessed students’
communication, critical thinking, assessment and nursing interventions in care following a structured simulation experience. The project also assessed the students’ perception of confidence in care following the structured simulation experience.

**Project Significance, Scope, Rationale**

Schools of nursing provide the theoretical information for students but are challenged to provide practical hands on practice. High fidelity simulation opportunities helped to augment clinical learning. Simulation allowed faculty to expose students to complex clinical experiences they might rarely see especially in rural settings, and all students have the same core experiences they might not equally get in the real clinical environment related to patient acuity and patient census. Through simulation students practiced decision making without harm to a real patient. Researchers have shown that students involved in active learning retain knowledge longer than those students involved in passive learning (Jeffries, 2007; Kolb, 1984; Lisko, 2010; Laschinger, 1990). High fidelity simulation is a method of active experiential learning. The high fidelity simulation experience, which took place in a controlled environment, allowed students to practice safely and gain knowledge they might not receive in chance learning experiences in clinical practice settings. Using the Sweeney-Clark’s rubric this project evaluated changes in students’ communication, critical thinking, assessment and nursing interventions across multiple simulation experiences.

**Review of Evidence**

**Theoretical Foundation for Project and Change**

This project examined the effect of high fidelity simulation on measures of student nurse performance in communication, critical thinking, nursing assessment, and nursing intervention. Benner (1984) and Benner, Tanner, and Chesla’s (2010) middle range novice to expert theory
and Kolb’s (1984, 1988) experiential learning theory are the theories selected to be the framework that underpin this practice issue. They were chosen as this practice problem is educationally-based. These models encouraged the integration of theory into practice in educational settings.

Kolb’s experiential learning theory and Benner’s novice to expert theory fit well as the foundation for this practice integration method designed to provide high fidelity simulation experiences in BSN nursing curriculum. Scenarios using high fidelity simulation experiences assist students to integrate learning. Fawcett (2005) discussed that when choosing a model for a project the origin, logic, and credibility should be considered. The components of student-centered educational practices, experiential learning, and collaboration (all aspects of both Kolb’s and Benner’s theory) are the essentials needed to integrate new knowledge.

Simulation is an experiential and transformational process as described by Kolb’s experiential learning theory. Kolb (1984) proposed that learning was a cyclic process that consisted of four interdependent constructs. These interdependent constructs were: concrete experiences, reflective observation, abstract conceptualization, and active experimentation. Kolb suggested learning happens when the student uses one or more of these four modes within the context of solving a learning problem. The theory suggests that while every person uses each of the four learning modes to some degree, the individual developed a preference for using two of the four learning modes over the others. Learning style was the preference for using certain modes over others. According to Kolb, the process of learning is continuous. Knowledge is created by transforming experiences into existing cognitive frameworks, ultimately changing the way a person thinks, processes, and behaves. Kolb (1984) asserted that it is through the experience that the individual learns. His theory suggests it is after the experience that the
individual develops comprehension through abstract conceptualization. For learning to occur, experiences must be transformed. Transformation occurs through the method of intention or extension. In simulation the extension is the experience within the simulation based on a scenario. The intention is the process achieved through reflection of the experience, which in simulation was debriefing.

Benner’s (1984, 2010) theory examined nurses’ competencies from being a beginner to an expert. When a person moves from novice to expert this process is characterized by a transformation from rules and behaviors to intuitive, contextually determined behavior. Progression from novice to expert is not a given and not measured in years. Benner (1984, 2010) suggested that while acquiring skills and knowledge the nurse passes through five levels of proficiency: novice/beginner, advanced beginner, competent, proficient, and expert. The transition between these levels represents the changes in skills knowledge and performance. Benner suggested that nurses need knowledge, clinical practice, and ethical training to move through the five levels of proficiency. High fidelity simulation allows students “practice” opportunities to integrate their didactic knowledge into proficient behavior (Gantt, 2010, p.101). These stages demonstrate the competencies gained by the individual as a nurse. Expert nurses used empirics, ethics, intuition, and knowledge in their practice. Kolb’s and Benner’s models have been widely used in nursing and are respected for their validity and reliability.

According to Lisko and O’Dell (2010) these models have been the subject of extensive follow up research in educational settings (p.3). The components of student-centered educational practices, experiential learning or active learning, and collaboration (all aspects of both Kolb’s and Benner’s theories) are also the fundamentals for high fidelity simulation. Simulation is a method to integrate nursing knowledge into the clinical setting. The benefit to the student is to
learn through this active, experiential learning process and move in this experiential level from novice to expert.

Initiating a transformative approach through high fidelity simulation in nursing education is an innovative educational approach to learning. This approach is congruent with today’s learners and has helped to transform theory into practice. This process enhances learning and assists students in obtaining the skills, knowledge, and critical thinking abilities needed in today’s increasingly complex care environments.

**Literature Review**

High-fidelity simulation has allowed educators to expose students to complex clinical experiences they might rarely see, especially in rural settings. All students were able to have the same core experiences with varying simulated patient acuity. Students practiced decision making in a safe setting without any possible harm to an actual patient. Medley and Horne (2005) discussed the advantages of using simulation specifically in nursing education. They noted that with simulation technology, undergraduate students gained skills in decision making, critical thinking, and team building within a safe environment.

Traynor, Gallagher, Martin, and Smyth (2010) discussed the introduction of simulation into an undergraduate nursing curriculum and noted that simulation helped students develop confidence and proficiency without compromising patient safety. Additionally, they found that students were able to better appreciate the relationship between theory and practice and through simulation experience, students gained confidence for future clinical practice. Researchers also emphasized high-fidelity simulation gave students a safe environment for practice (Brown & Hanberg, 2006; Catanzaro & Morrison, 2010; Garrett, Jackson, & McPhee, 2010; Hardner, 2010; Jefferies, 2007, 2009; Lisko, 2010; Whyte, 2010). Fellner, Mann, Perron, and Sullivan (2009)
and others noted the value of high-fidelity simulation in helping nursing students incorporate theoretical knowledge into clinical simulation (Cormier & Hauber, 2009; Harder, 2010; Kardong-Edgren, Adamson, & Fitzgerald, 2009).

Sullivan-Mann, Perron, and Fellner (2009) also evaluated whether more exposure to simulation scenarios would lead to increased critical thinking scores using the Clark rubric. They demonstrated an increase in critical thinking scale scores with simulation. This study was one of the first quantitative studies to show statistically significant evidence of the value of simulation in nursing education.


Lasater (2007) noted that, through the use of high fidelity simulation, data were presented indicating the nurse must prioritize, make sense of, and decide about the best course of action and activities which support clinical judgment. Lisko (2007) also noted the ongoing need for improved clinical competencies in nursing student’s skills and advocated for high-fidelity simulation as a means of achieving those skills. Jefferies (2007) further discussed the need to change nursing education from teacher-centered to an active or experiential student-centered process. High-fidelity simulation also fulfilled this challenge.

Gantt (2010) noted that as simulation becomes a common strategy used in nursing education, faculty need to find instruments to evaluate student performance. Clark (2006) developed a simulation rubric found by Gantt (2010) to be an effective and useful tool to
evaluate simulations regardless of the clinical topic being evaluated. The original Clark rubric (2006) has since been revised from six to eight categories. The eight categories addressed in the expanded Sweeney-Clark’s Rubric (2009) include: patient assessment and reassessment; history-gathering; clinical judgment or critical thinking; collection of labs and data diagnosis studies; patient teaching; communication; safety; and nursing interventions. The tool used a five point Likert scale in grading each category ranging from novice (1) to expert (5). Participants were ranked in each of the eight competency categories by observers during simulation experiences.

Recurring Themes in Simulation Literature

A synthesis of the literature to date on high-fidelity simulation reflected several recurring themes. Areas of consensus included the utility of simulation as pedagogy to enhanced active learning, increased safety, and increased experiential opportunities. Additionally, simulation experiences had been shown to increase student confidence, appreciation of the theory/practice relationship, and enhanced critical thinking skills and self-analysis. Thus high fidelity simulation provides an innovative method of incorporating clinical and theoretical knowledge and experiences for nursing students. These strategies and experiences assist students in the development of critical thinking abilities needed for working in the real world.

Today’s fast changing and complex nursing environment demands “higher levels of clinical judgment including critical thinking skills” (Lisko, 2007, p.6). As nurse educators, we need to consider and develop new strategies for learning. High fidelity simulation offers experiential learning that will foster the development of student nurses’ clinical judgment and critical thinking skills and abilities. Simulation is being accepted nationally and globally as an educational strategy or tool in nursing education as simulation so closely mimics real world clinical experiences. Simulation leads to effective learning. While clinical simulation cannot
completely replace actual clinical experiences with patients, families and communities, simulation can serve as an excellent partner or adjunct or alternative to the total clinical experience. The literature suggests that simulation might bring all the pieces together for students to gain a better understanding of patient care and that “high-fidelity simulation may be the missing link between knowing and doing. Students can experience critical situations in a controlled simulation environment and learn leadership during the simulation experience” (Brown & Hanberg, 2006).

**Conceptual Model: Logic Model**

One method of evaluating practice was to “assess practice patterns against national benchmarks to determine variances in clinical outcomes and population trends” (Zaccagnini & White, 2011, p.98). In many areas, nursing effectiveness was assessed through nurse-sensitive indicators. Frequently these indicators were also linked with quality. In organizations where nurses functioned as the nursing administrators they were responsible for collecting, evaluating, and reporting nurse-sensitive outcomes. Often the processes of evaluation or assessment were a result of mandates from an outside accreditation organization. “As leaders in clinical care and outcomes evaluation, DNP’s must be in the forefront of designing outcome evaluation plans for practice” (Zaccagnini & White, p.98).

The Logic Model (1998) was chosen for project planning as it had the capacity to accurately depict the proposed project both visually and narratively. It served as a tool that helped in the development of strategies that clearly explained the concepts surrounding this project.

The Logic Model (1998) helped in the planning process because it demanded careful definitions of the resources and inputs that impacted the project; the activities that were project...
interventions; the outputs that were the immediate result of the project activities; the outcomes that measured the results of the project; and the impacts which defined the ways the project results impacted practice. It was a linear process where one concept leads to another. The Logic model is shown in Appendix C.

According to Zaccagnini & White (2011) the main responsibility and character of the DNP in clinical scholarship is to assimilate that scholarship into their practice. Through this integrated process (i.e. the Logic model) a focused, systematic, and mindful effort was made with the emphasis on inquiry outcomes and supportive evidence in practice. This capstone project demonstrated that simulation was an educational intervention that was useful in providing a safe and consistent environment for clinical practice for students in rural nursing programs. Because “the DNP must not only embrace the process, but also implement the findings in ways that ultimately change or, at least improve, practice and outcomes” (Zaccagnini & White, 2011, p. 68) the Logic model was so useful. This high fidelity simulation project had its outcomes based on performance; the performance outcomes were then used by the College as part of program evaluation, specific to the competencies demonstrated by the student through simulation. The Logic model is diagrammed in Appendix C.

In summary, Kolb and Benner were selected to be the frameworks that underpin these practice issues. Kolb’s and Benner’s models have been widely used and are respected for their validity and reliability (Laschinger, 1990; Lisko & O’Dell, 2010). According to Lisko and O’Dell (2010) the models have been extensively researched in educational settings. The components of student-centered educational practices, experiential learning or active learning, and collaboration (all aspects of both Kolb’s and Benner’s theories) were also the fundamentals
for high fidelity simulation. Simulation was a method to integrate nursing knowledge into the clinical setting. It benefited the student to learn through this active, experiential learning process.

**Project Plan and Evaluation**

**Market/Risk Analysis**

**Project Strengths**

The Sweeney-Clark rubric was an effective tool when used to evaluate competencies of assessment, critical thinking, communication and nursing interventions. The inter-rater reliability was easily established for the instrument. The Sweeney-Clark rubric was a successful tool for the evaluation of the individual student, cohorts of students, and core curriculum or program evaluation. High fidelity simulation experiences helped students to feel more self-confident and they maintained a high level of satisfaction with the learning process. High satisfaction would tend to maintain an enthusiasm in the students in regard to learning in simulation and clinical.

A positive crossover effect from simulation to the clinical setting has been suspected but there has been little data to confirm this outcome. This study suggested that simulation does increase clinical competencies in the areas of assessment, critical thinking, communication, and nursing interventions and students find increased self-confidence and satisfaction in the clinical setting due to their experiences in simulation. Simulation was a tool for the integration of theory into practice.

**Threats or Weaknesses**

In the identification of the challenges inherent in analysis of outcomes data there are potential threats to validity and reliability for any project. The following are threats considered for this project and possible ways to minimize the threat potential. Measurement and observation within the design was employed to strengthen the design. Careful consideration and backup assistance and guidance from faculty, peers and clinical mentor helped to assure the use
of an appropriate design. A possible threat to the project was the maturation of the subjects. When observing subjects over time and evaluating students with the same tool, it was difficult to tell what was learned from class, from clinical rotations, or from personal growth and development as compared to changes which have resulted from repeated exposure to high fidelity simulation. For this project maturation was considered an extraneous variable.

The sensitivity of the testing and tool could have been affected by inter-rater reliability. However, as noted in the literature, Sweeney-Clark’s rubric inter-rater reliability was easily established. Consistent raters for all situations provided consistent evaluation. Raters were trained to 94% agreement for each behavior observed.

Subject selection as a threat to internal validity was decreased by using all students as part of the program evaluation within their clinical courses. In order to evaluate whether or not students were able to transfer information from simulation to the clinical setting, a random sample of twenty percent was selected from each group and, using Sweeney-Clarks rubric, students were observed in the clinical setting after the high fidelity simulation experiences were completed. Data was collected through observation of students as well as through student feedback. The satisfaction tool allowed students to indicate how they felt. An example of this was if they were more comfortable in lab because of simulation experiences. A small sample size would help to increase the standard error. This factor must be considered, not to over generalize in the interpretation of the results.

There was expected to be little or no experimental mortality or loss of subjects from the study because the data collection occurred over one semester time with at least two simulations experiences per group and one clinical observation. Students were required by class and curriculum requirements to attend simulations. Students were usually lost at the end of semester
only due to failing a course. It is rare for a student to drop a course mid semester. Unfortunately, after the first simulation experience (T1) for sophomore students their second simulation experience was canceled by the course faculty and the investigator had no control over these events. Missing data existed, therefore, for T2 and T3 for the nine sophomore students in this study. There were no other missing data for any other reason.

While missing data can be a problem, using good quality control and continuous monitoring of quality minimizes missing data. The literature suggested using the available data if outcomes data is missing (drop subjects from the study). In surveys research, investigators “expected a certain amount of random non-response in every study” (Kane, p.309). There was not a pattern of non-response and the data were equally distributed across all subjects, therefore a systematic bias was not introduced. While dropping participants might be advised in some situations, losing more than one to two percent of participants could introduce significant attrition bias into a study. The outcomes study overall loses statistical power and becomes less representative of the target population when there is significant attrition across a longitudinal study. In this study acceptable methods for dealing with missing data included:

- SPSS use of a dummy variable code for missing items
- Interpolation of outcome values
- Carrying last observed outcome forward
- Interpolation between known outcomes

In this study the sample included 57 students. The sampling error according to Kane (2011) or level of precision was plus or minus six percent. For 57 subjects, 95% sample errors will include the true mean for this population (p.283). An expert in statistics assisted in the analysis process.
The Hawthorne effect was a consideration because subjects were observed in this study. By using a longitudinal method, however, students were observed several times over the semester and were familiar with the investigator as an instructor thus decreasing the impact of the Hawthorne effect. A majority of the students appeared comfortable and remarked in debriefing sessions they felt a little nervous in the beginning of the first simulation experience but became comfortable in the simulation setting as the scenario progressed.

Threats to external validity were minimized by the collection of demographic data to identify previous knowledge levels and previous experiences with high fidelity simulation. Age, gender and residence location were assessed. Threats were also minimized by using the correct statistics such as paired sample t-tests, correlation studies, and measurements for error and correlation coefficient to show strength and direction of a relationship. A statistician was used as a consult to assure appropriateness of data analysis. Finally, previous knowledge level and patterns of subject participation was considered an extraneous or novelty effect.

**Driving Forces/Need**

In rural areas the need for use of high fidelity simulation was great. There was decreased access to clinical sites for student clinical experience. It was even more difficult in rural areas to find master’s-prepared mentors and preceptors with whom students could practice. The high fidelity simulation experience was a safe environment and a controlled experience in which students practiced safely and gained knowledge that they might not receive in random learning; additionally they gained competency, improving self-perception, and enhancing self-efficacy.

According to Benner:

According to Benner (2010) there has been a growing shortage of nurses. With decreased student numbers since the 1990’s this created the conditions for a severe
nursing workforce shortage. This shortage was predicted to grow in the coming decades as aging nurses retire. To meet currently projected shortages, nursing education needs produce more graduates for the workforce. Yet the pool of qualified faculty remains small. The faculty shortage poses serious challenges for schools. Many faculty report that they cannot take any more students even as schools are enlarging classes and scrambling to find more clinical sites, preceptors, and staff willing to teach students.

Rural schools of nursing have greater difficulty finding and recruiting faculty due to low salary and remoteness of location. These challenges were compounded in rural areas with less access to care, reduced access to quality clinical sites, fewer qualified preceptors, and fewer clinical experiences.

Nursing students in rural programs are considered underserved in that they lack access to health care clinical sites for practice skills. They lack availability of mentors and preceptors due to the nursing shortage and an amplified shortage of nursing faculty. Laschinger (1990) suggested that current approaches in education were based on theory and were research-based. According to Laschinger (1990) nursing has been seen as a series of tasks that are performed (as it was seen in the past), but today nursing is process based. Nursing is based on a distinct body of knowledge derived from a particular view of the client and their needs. According to the literature, nurses are needed to integrate theoretical, conceptual, and behavioral knowledge and skills within their practice. Nursing education should try to provide a learning environment that facilities the development of both competencies. The utilization of high-fidelity simulation experience assists in that process.
With the advances in technology, simulation provided another venue or clinical site for student experiences. Learning in simulation provided a consistent environment for student learning for core course experiences. Simulation was not a replacement of the clinical setting; instead it was an important, creative adjunct. High-fidelity simulation allowed educators to expose students to complex clinical experiences they might rarely see, especially in rural settings. All students have the same core experiences they might not equally get in the hospital or clinical environment with varying patient acuity and census. Students practiced decision making in a safe setting without any possible harm to an actual patient.

The Institute of Medicine (IOM) (1999) identified event risks within the United States (U.S.) healthcare system, including the fact that “44,000 to 98,000 Americans die each year from hospital-related medical errors” (IOM, 1999). Medical errors (IOM, 2010) were the third leading cause of death in the U.S. after heart disease and cancer. As the focus on patient safety and improved patient care and clinical outcomes continued, a key stakeholder and driver in the simulation movement was the medical malpractice insurer (Wilson & Rockstraw, 2011). In the past some insurers helped with financial support to fund simulation sites in high risk areas such as anesthesia and obstetrics and expected that better training would decrease the risk for adverse outcomes. Simulation allowed students to make mistakes and learn from those errors without harming a patient. Students experienced the consequences of their decision making process and patient care or the lack thereof without causing harm. Knowledge, skills and competencies as well as motivation and ability to problem-solve and work in a high-stress environment is needed to provide safe and effective care in today’s care settings. Simulation gave such
opportunities to students in a safe learning environment. There was much creativity, commitment, and passion expressed with the use of simulation in promoting patient safety in nursing education. Simulation promoted and advanced the course objectives and helped to evaluate core competencies for the individual as well as for the program.

**Restraining Force**

A restraining force in simulation has been in the concept of “mannequin think” (Wilson & Rockstraw, 2011, p. 105). Mannequin think has been seen when students have difficulty transferring skills learned in isolation during simulation, not seeing the situation as real. This effect has been decreased by the use of complex clinical experiences, with real distractions and real simulation interactions, with other care givers and family members. The literature suggested the more realistic the situation, the better information and skills can be transferred in the clinical setting. The simulation lab at WVWC was in the beginning phases but the simulation experiences were delivered using complex clinical scenarios with real distractions and real simulation interactions between the patient, other caregivers, and the family.

Another restraining force was price or cost to build, equip, and staff a high fidelity simulation lab. High fidelity simulation equipment is very expensive. Many intuitions and facilities find that cost is a restraining factor in development of such a lab.

**Resources and Sustainability**

WVWC was fortunate to have a donor who gave the funding needed that began the existing small, two mannequin simulation unit. Costs remained a major factor in upkeep and expansion of equipment and faculty needed. Grants were sought for additional funding. No grant funding obtained however, to this time.
**Stakeholders and Project Team**

Major stakeholders were the faculty and students of WVWC. Other stakeholders were the potential and actual patients these students cared for in clinical settings and patients these competent nurses will care for post-graduation. The project team consists of: the main investigator, clinical mentor, student advisor, committee chair, volunteers used in collecting data and the second rater.

**Cost-Benefit Analysis**

Wilson & Rockstraw (2011), stated “simulation is the most time-and-cost-effective method to conduct experiential learning for students with optimized outcomes in learning” (Wilson & Rockstraw, 2011, p.66). Most studies agreed that more research was needed in the area of simulation. Simulation was described in the literature as a creative intervention beneficial to nursing education. Its benefits are many. With simulation technology, undergraduate students “gained and improved skills in a safe, non-threatening, experimental environment that also provided opportunities for decision making, critical thinking, and team building” (Medley & Horne, 2005, p.31).

Globally, the benefits to students, patients, schools of nursing, and society are many. The benefit of simulation experiences for students is that it allowed students to learn skills and practice patient care and decision making in a safe environment where patients received care without harm. It allowed the experience to be equal for all students. Students were able to make mistakes without doing harm to a patient. Fewer mistakes with a real patient improved care and increased patient safety. When there are mistakes that are made in the clinical setting the cost of injuries and lives are at a considerable financial cost to all. For hospitals, schools of nursing and society in general, simulation promotes safety (IOM, 2010) and should work to decrease liability.
Decreased liability decreases health care costs in the long run (Cleverley, Song, & Cleverly, 2011).

When students learn to be better critical thinkers the potential impact for schools of nursing would be a higher NLCEX pass rates. Simulation assists students to learn to be better critical thinkers; it is reasonable to think that multiple simulation experiences help in that process. A significant benefit of simulation learning would be to produce better prepared graduates who could provide sound clinical reasoning and make fewer mistakes. However, the costs to develop a simulation lab are significant, especially in the construction and equipment phases. But preventing or decreasing harm or injury to a patient in a clinical setting is priceless to all involved. Thus not providing simulation could be considered a far greater liability than the upfront cost needed to build, equip, and staff a simulation lab. Appendix D describes costs and budget for this capstone simulation project.

**Risk/Benefit Assessment**

This study posed minimal risk to participants. Students may have felt increased stress because they were being observed. During the project there was no way for students to differentiate between the observers (raters) for this project and the other faculty scheduled for the simulation sessions. WVWC has a small faculty and all assisted in the simulation process whenever possible. The observers (raters) were behind a two way mirror during both situations. Participants in simulation knew they were observed which was considered a minimal risk. There were no negative repercussions or impact on final grading from choosing to participate or not to participate in this study. A potential benefit was enhanced learning and experience with simulation patient experiences prior to clinical experiences with actual patients. The environment was safe for both student and patients alike.
**Project Objectives**

As a practice discipline, experiential learning is the core of nursing educational foundations. Nurse educators are challenged with the responsibility of preparing students to be knowledgeable, critical thinkers who communicate effectively and skillfully and are competent workers in a highly technological and information-infused health care environment. It is essential that all nursing students develop skills in these areas to provide effective, safe, and high quality patient care. It is through the integration of theory into practice that such a process can occur. It is through the use of high fidelity simulation that students will have the “real world” experiences that will afford all students the opportunity to build their competencies in a safe learning environment.

**Mission** of this high fidelity simulation program was to deliver the highest quality of clinical experiences in the training of learners at various stages in their nursing education.

**Goals**

- Using this creative and collaborative approach in education, high fidelity simulation experiences will foster a partnership between faculty and student in the process of integration of nursing theory into evidence based practice.

- Through the use of simulation in nursing education students’ self-confidence, critical thinking/clinical judgment, communication, nursing interventions and patient assessments skills along with patient safety and use of history, pertinent-tests, and labs competencies will increase for students through the ongoing use of simulation in curriculum. Students will carry this knowledge/skill/self-confidence over to actual clinical patient experiences.
• Faculty will be able to use scores obtained through simulation evaluation (Sweeney-Clark assessment tool) to evaluate program core competencies for students throughout the levels.

Vision

• Through the use of high fidelity simulation learners will be offered a safe environment wherein they can develop and refine their communication, critical thinking, ongoing assessments, and patient care interventions within an honest, non-judgmental feedback setting within the framework of a variety of simulation experiences throughout the curriculum.

Objectives

Two simulation experiences will be utilized each semester from sophomore to senior year.

• The Sweeney-Clark rubric scores (obtained with each simulation experience) will be used as a measure to evaluate core program outcomes (critical thinking, assessment, nursing interventions and communication) for students in the program at each class level, each semester, and correlate such data for the end of program outcomes.

• Students' self-confidence will increase with the increased use of simulation experiences as measured on the NLN Self-Confidence/Satisfaction questionnaire.

• Students will be able to carry over the knowledge/skill and self-confidence experienced in simulation to actual patient care experiences in clinical as measured with the Sweeney-Clark rubric.
**Evaluation Plan**

The Logic Model (Zaccagnini & White, 2011) was used as a program planning template. This model assisted the investigator to have a strong evaluation plan which was systematic and visual in the identification of outcomes right from the beginning. The Logic model provided a visual diagram or picture of how the investigator saw the project working. The evaluation looked at goals, objectives, timeframes, as well as the broad range of data collection both quantitative and qualitative.

This project evaluated nursing students’ level of communication, critical thinking, assessment and nursing interventions using the Sweeney-Clark’s rubric in high fidelity simulation across multiple experiences. The NLN (2005) Student Satisfaction and Self-Confidence in Learning Scale and a Demographic survey were administered and the data analyzed to evaluate the effect simulation had on competency scores. The project outcomes (2011) were performance and competency related; these competencies in critical thinking, assessment, nursing interventions and communication were compared and used to evaluate student learning and program outcomes.

This method of evaluation helped to provide accountability, demonstrated quality improvements and demonstrated effectiveness in the population involved in this study. This model helped to provide clarity of purpose to the project and its possible impact on nursing practice.

The Logic model guided a thoughtful design that would enhance the likelihood the outcomes of this project would be met. Using the Logic model as a template for planning the evaluation of the project fitted with the project and guided the choice of appropriate methods of
the repeated measure; quantitative design that collected the appropriate data which best demonstrated the results of the study (See Appendix C Logic Model - Evaluation Plan).

Methodology

Population/Sampling Parameters

This project was an outcomes research design utilizing a convenience sample of pre-licensure BSN nursing students. Students were recruited at the beginning of the semester from each of the three educational levels and told that participating in the project was voluntary; they were able to withdraw from the project at any time; and non-participation would not affect their grades in any way. Students were given an informed consent document and contact information for the primary investigator. The sample consisted of nursing students from sophomore to senior level (57), who would have two simulation experiences. Of that sample, 20% of students from each level (sophomore, junior, and senior) were randomly selected and rated using the Sweeney-Clark rubric during one clinical experience following their simulation experiences. Unfortunately, the time 2 (T2) and time 3 (T3) experiences for sophomore students were canceled by course faculty and the investigator had no control over these events. Missing data existed, therefore, for T2 and T3 for the nine sophomore students in this study. There were no other missing data. Time two (T2) and time three (T3) in the study were made up of junior and senior students only.

The convenience sample for this project was 57 WVWC undergraduate baccalaureate nursing students in their sophomore, junior, or senior year. Participants were voluntarily recruited at an assembly of all nursing students held at the beginning of the school year 2011. Only sophomore, junior and senior students in a clinical course were eligible to participate in the study. It was expected that students would have different levels of experience with high-fidelity
simulation experience ranging from no experience to several experiences depending upon year of study in the nursing program. Participants who consented to participate had their first and second simulation experiences during regularly scheduled simulation lab and a random sample of 20% of students across the levels had a third observation during their clinical experience at the end of the semester. This observation took place during a student’s clinical experience. To identify the 20% of participants for the third observation, a table of random numbers was used to generate the students from each class.

**Setting**

The setting was an undergraduate BSN small, private, non-profit, church related college in a Mid-Atlantic State. A convenience sample of nursing students in clinical courses was used. Participation was voluntary. Students were at least 18 years of age and able to read and write in the English language. Informed consent was obtained (See Appendix E). All students were given a cover letter and an explanation of the study at a Nursing Department assembly. They were told that participation was voluntary and that they could withdraw at any time. All responses were kept confidential and participation in this study would not affect their course grades.

**Ethical Considerations and Provisions for Anonymity or Confidentiality**

All data was submitted using the students Datatel number and were held in confidence. The information from the Sweeney-Clark’s rubric was used for program evaluation and was looked at as an aggregate rather than individually. Student confidentiality was maintained throughout (See Appendix F CITI training certification). Datatel numbers were not linked with the students’ names and neither the surveys instruments responses nor the evaluation results from the Sweeney-Clark’s rubric were used for course grading purposes. Records were kept in a
double lock system (i.e., a locked file in a locked office). All responses were kept confidential and no names were associated with responses. Once data was collected, the primary investigator was the only person to have access to these records. All records will be kept for three years before being discarded by shredding. Students were told that participation was voluntary and that they may stop participation at any time. There were no negative repercussions if they choose not to participate and it would not impact their final grades for the courses. All Datatel information was destroyed after data entry. It was the responsibility of the PI investigator, and any who assisted in this process of data collection, to abide by ethical research practices and uphold the established federal guidelines.

**Instruments**

A demographic survey designed by the investigator was completed by each participant. The independent variable was simulation. The dependent variables for the study were competence in clinical simulation and perceived satisfaction and self-efficacy. The Sweeney-Clark Rubric (2009) was used to measure students’ level of competency for measures of critical thinking, assessment, communication, and nursing care interventions. Sweeney and Clark (2009) have granted permission for the use of the instrument (Sweeney, July 9, 2010, personal communication). Self-efficacy and student satisfaction were measured by the Student Satisfaction and Self-Confidence in Learning Scale (NLN, 2005). Permission for use of this instrument had been granted by the National League for Nursing through purchasing forms through the School of Nursing. Two faculty observed the same simulation and rated the results. Raters had achieved through training and practice an inter-rater reliability between observers of 94% reliability. The same two raters were used throughout the entire study with all simulation and clinical rating experiences.
This study was an outcome research project with a quality improvement (QI) initiative conducted through program evaluation. The outcomes became a part of the West Virginia Wesleyan College School of Nursing curricular assessment process to evaluate program core outcomes. The results established protocols for embedded assessment (program evaluation) of the simulation laboratory experience in the School of Nursing.

**Demographic Survey**

A demographic survey designed by the investigator was given to all participants at the beginning of the study. No names were used; however, students were asked to use their Datatel numbers so that subsequent survey responses may be compared. There was a Key with student names and Datatel numbers established to match data. The key was used only to match data for data entry. The demographic questionnaire (See Appendix G) was included with the following items: age, gender, year in nursing program, previous clinical nursing courses, previous simulation experiences and previous clinical nursing experiences.

**Sweeney-Clark Rubric**

Participants who consented to participate had their first and second simulation experiences during regularly scheduled simulation labs and a random sample of 20% of students across the levels had a third observation during their clinical experience at the end of the semester. Students were rated during each simulation on critical thinking, communication, assessment and nursing care interventions using the Sweeney-Clark Rubric scales. Raters achieved through training and practice an inter-rater reliability of 94% agreement. The Sweeney-Clark rubric was an eight category rubric that used a five point Likert scale based on Benners’ Novice to Expert (1 to 5) theory. When interwoven with Blooms taxonomy the categories range from “doesn’t see the picture” (Novice) to “anticipate the changing picture” (Expert) (Sweeney
& Clark, 2009). “The rubric’s creator used a panel of experts to establish content validity and stated that the rubric differentiated the performance of students in categories consistent with Benner’s model” (Clark, 2007).

After each simulation experience participants entered their Datatel number and filled out the self-report Student Satisfaction and Self-Confidence in Learning Scale developed by the National League of Nursing (NLN). The Student Satisfaction with Learning Scale (NLN, 2005) was a five item instrument designed to measure student satisfaction with five different items related to the simulation activity. These items included the following:

- The teaching methods used in the simulation were helpful and effective;
- The simulation provided me with a variety of learning materials and actives to promote my learning in the curriculum;
- The teaching materials were used in this simulation were motivating and helped me to learn;
- The way my instructor taught the simulation was suitable to the way I learn.

The Content validity of the NLN Student Satisfaction and Self-Confidence with Learning Scale according to Jefferies (2007) was established by the utilization of nine clinical experts, validating the content and relevance of each item for the concept of satisfaction. Reliability was tested using Cornbach’s alpha and found to be 0.87.

The Self-Confidence in Learning Using Simulations Scale (NLN, 2005) was an eight item instrument measuring how confident students felt about the skills they practiced and their knowledge about caring for the type of patient presented in the simulation (Jefferies, 2007). The eight items included: I am confident that I am mastering the content of the simulation activity that my instructors presented to me; I am confident that this simulation covered critical content
necessary for the mastery of the curriculum; I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting; My instructor used helpful resources to teach the simulation; It is my responsibility as the student to learn what I need to know from this simulation activity; I know how to get help when I do not understand the concepts covered in the simulation; I know how to use simulation activities to learn critical aspects of these skills; It is the instructor’s responsibility to tell me what I need to learn of the simulation activity content during class time. In the NLN simulation study, the content validity was established by nine clinical experts and reliability, tested using Cronbach’s alpha, was found to be 0.87 (Jefferies, 2007).

After all simulation experiences were completed, a third observation was made for 20% of the students who have been chosen randomly from all three levels. This observation took place during a student’s clinical experience. To identify the 20% of participants for the third observation, a table of random numbers was used to generate the students from the junior and senior class. The raters in the clinical setting were previously trained raters from the simulation setting. The identical instruments (Sweeney & Clark rubric), measuring competency, and the NLN Student Satisfaction and Self-Confidence in Learning Scale, was employed.

All information was kept confidential and secure. Only the investigators had access to the information and data. The information was kept in a locked file in a locked office. Data on the computer was password protected. All records will be destroyed by shredding in one year.

**Data Collection protocol**

Nursing students were recruited into the study at the beginning of the semester. Once they were enrolled in the study and completed their informed consent they completed a demographic questionnaire. All participating students were observed in the Nursing Simulation
Laboratory at two different times (T1, T2) and 20% of junior and senior participants, at (T3) in the clinical setting. The inter-rater reliability coefficient of 94% was achieved. Sweeney-Clark’s (2009) rubric was designed to score performance in these competencies in a range from one to five which corresponds to Benner’s Novice to Expert categories. The rubric was designed to assess the student nurses’ competence in these four areas and thus support course evaluation/program evaluation specific to these outcomes.

Following each simulation experience (T1, T2, and T3), participants completed the Student Satisfaction and Self-Confidence in Learning scale. This instrument measured satisfaction, self-confidence, and student’s perception of the experience.

In this study, the independent variable, the use of high fidelity simulation lab technology as pedagogy for student learning, was examined for its effect on the dependent variables (critical thinking, assessment, communication, and nursing interventions) as measured using the Sweeney Clark rubric (2009). Additionally, the dependent variables of student satisfaction and self-confidence in learning were evaluated by use of the NLN satisfaction survey as well as having the opportunity to write antidotal comments on the surveys across the study.

Extraneous variables include but were not limited to student maturation within the program. The extent to which the student was involved during the simulation experience was observed. The number of prior experiences with simulation and prior clinical nursing experiences were considered maturation information and thus an extraneous variable. These extraneous variables were considered and reported. No students’ names were used. Datatel numbers were utilized to allow for comparison of T1, T2 and T3 data. After data entry for comparison, Datatel numbers were eliminated to retain anonymity.
**Data analysis**

Data was analyzed using statistical package SPSS for the social sciences. Statistical significance for this project was set at the p=0.05 level. Instruments used in this study were: investigator-designed demographic survey, Sweeney-Clark rubric (2009), and the NLN (2005) Student Satisfaction and Self-Confidence in Learning scale.

**Demographic Survey**

The demographic data was analyzed using descriptive statistics and was used to describe the sample. Means, minimum and maximum values, ranges, and standard deviations were shown. The profile of participants was presented and described by aggregate group as well as by education level to afford opportunities for between group comparisons (See Appendix G)

**NLN Student Satisfaction and Self-Confidence in Learning scale**

A self–report scale that measured perceived satisfaction and self-confidence (Appendix B) was analyzed for changes across time in this study. Specifically, these measures were analyzed with means and paired t-tests, repeated measure analysis of variance and with selected correlation coefficients. Comparison of perceived student satisfaction and self-confidence scale scores with Sweeney-Clark competency scores were analyzed for each time interval and across all time intervals using multivariate methods.

**Sweeney-Clark Rubric**

The Sweeney-Clark (2009) rubric was an eight category grading rubric for competence in the areas of: communication, assessment, history gathering, patient teaching, lab data and diagnostics, nursing interventions, clinical judgment or critical thinking, and safety. The Likert five point scales were based on Benner’s Novice to Expert Nursing theory interwoven with Bloom’s taxonomy. This rubric measured competencies in the categories listed above; however, for this project, competencies were measured in four of the eight areas (communication,
assessment, critical thinking, and nursing intervention – (See Appendix A) Inter-rater reliability was accomplished by training and practice with a goal of 94% or greater point-by-point agreement.

Data from the Sweeney-Clark rubric was analyzed using paired t-tests and repeated measures analysis of variance with post hoc testing. Selected correlation coefficients, means and percentages, using demographic data at the interval level (i.e., age and number of previous simulation lab exposures) were analyzed.

**Project Findings and Results**

**Data Analysis**

Results of this descriptive, repeated measures study comparing Sweeney-Clark competency scores assessed during high fidelity simulation across multiple time intervals are presented. Sweeney-Clark scores were also evaluated for a final time in the clinical setting to evaluate transfer of those competencies to direct patient care. The scores from the NLN satisfaction and self-confidence questionnaire (assessed over the three time periods) were reported and compared. Findings for time one (T1) and time two (T2) simulation experiences, as well as the time three (T3) clinical experience are displayed along with a presentation of the demographic data for the sample. The data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) (Version 20, 2011) (Data Management Appendix H).

**Demographic Characteristics of the Study Population**

The sample was composed of 57 participants who agreed to participate in this study. Participants were students in an undergraduate BSN program and included sophomores, juniors and seniors. Their ages ranged from 19 to 35 years of age, with a mean age of 22 years as shown in Table 1.
Table 1

*Age Distribution of the Study Population*

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 – 19 yrs.</td>
<td>5</td>
<td>8.7</td>
</tr>
<tr>
<td>20 – 22 yrs.</td>
<td>37</td>
<td>64.9</td>
</tr>
<tr>
<td>23 – 25 yrs.</td>
<td>8</td>
<td>14.0</td>
</tr>
<tr>
<td>26 – 28 yrs.</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>29 – 31 yrs.</td>
<td>1</td>
<td>1.8</td>
</tr>
<tr>
<td>32 – 35 yrs.</td>
<td>3</td>
<td>5.3</td>
</tr>
</tbody>
</table>

All participants were enrolled in a nursing course with clinical and simulation components within the school of nursing. Fifty one of the participants were female and six were male as shown in Table 2. In response to the question regarding educational level within the school of nursing, nine participants (15.8%) noted they were sophomores, 24 were juniors (42.1%), and 24 seniors (42.1%) as shown in (Table 3).

Table 2

*Sample and Gender*

<table>
<thead>
<tr>
<th>Gender (n=57)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>6</td>
<td>10.5</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
<td>89.5</td>
</tr>
</tbody>
</table>

Table 3

*Education Level of Sample Population*

<table>
<thead>
<tr>
<th>Education Level (n=57)</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sophomore</td>
<td>9</td>
<td>15.8</td>
</tr>
<tr>
<td>Junior</td>
<td>24</td>
<td>42.1</td>
</tr>
<tr>
<td>Senior</td>
<td>24</td>
<td>42.1</td>
</tr>
</tbody>
</table>
Within the sample population 71.9% listed their residence as being in West Virginia while 28.1% reported living in eight other states. Regarding the number of previous simulation experiences, 22.8% students reported having zero to one previous simulation experiences; 45.6% had two to three previous simulation experiences; 28.1% had four to five previous simulation experiences and 3.5% had six to seven previous simulation experiences prior to data collection (Table 4).

Table 4

<table>
<thead>
<tr>
<th>Number of Previous Simulation Experiences</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 1</td>
<td>22.8</td>
</tr>
<tr>
<td>2 to 3</td>
<td>45.6</td>
</tr>
<tr>
<td>4 to 5</td>
<td>28.1</td>
</tr>
<tr>
<td>6 to 7</td>
<td>3.5</td>
</tr>
</tbody>
</table>

The first simulation for this study (time one) (T1) was done by observing simulation performance and rating specific competencies using the Sweeney-Clark rubric; the specific areas assessed included: assessment, communication, critical thinking, and nursing intervention. The students were given the NLN satisfaction and self-confidence questionnaire after the experience.

Three faculty members participated in the study. One faculty member was the simulation lab coordinator and was in charge of setting up and running the technology of the simulation experience. Two faculty participated as raters. The second (time 2) (T2) and third (time 3) (T3) simulation experiences were completed using only the juniors and senior students in the sample population. Thus, there were a total number of 48 participants (juniors and seniors) for the T2 experience and a total number of 10 junior and senior participants for the T3 experience.

Paired t-tests were used to compare time one and time two data as well as time two and time three data for the sample population. At each designated time (T1, T2, T3) participants were
assessed using the Sweeney-Clark rubric competency ratings for assessment, critical thinking, and communication and nursing intervention. Each specific criterion was given a competency rating on a five point Likert scale score based upon the Benner model. A Sweeney-Clark competency score of one equated to Benner’s categorization of novice, a score of two equated with Benner’s advanced beginner while a score of three equated to a competent rating. A score of four equated to a proficient score and a five equated to the highest level possible, that of expert. At the time of the first simulation experience (T1) 84.2% of students in the sample study reported that they had had some prior simulation experiences.

*Sweeney-Clark Rubric Findings*

Findings for the sample taken as a whole at time one (T1) using the Sweeney-Clark rubric showed a mean of 1.3, standard deviation 1.0, with a range of (-1.0 minimum to 5.0 maximum) scored on a five point scale. The sophomores on their first (T1) simulation experience were rated less than 1 on the Sweeney-Clark rubric by the two raters. This decision was made because even with much prompting the students were not able to meet the competencies of level 1 on the scale (novice minimal competency). Time one (T1) data as shown on Table 5 were collected to develop a base line to compare future simulation data.
Table 5

*Time One (T1) Means and Standard Deviations per Competency*

<table>
<thead>
<tr>
<th>Time one (T1)</th>
<th>Assessment</th>
<th>Communication</th>
<th>Critical Thinking</th>
<th>Nursing Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ed. Level</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>-.777</td>
<td>.333</td>
<td>-.777</td>
<td>.555</td>
</tr>
<tr>
<td>(SD)</td>
<td>(.666)</td>
<td>(1.00)</td>
<td>(.666)</td>
<td>(.881)</td>
</tr>
<tr>
<td>Junior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>1.45</td>
<td>1.41</td>
<td>1.54</td>
<td>1.45</td>
</tr>
<tr>
<td>(SD)</td>
<td>(.508)</td>
<td>(.503)</td>
<td>(.588)</td>
<td>(.588)</td>
</tr>
<tr>
<td>Senior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>2.04</td>
<td>2.04</td>
<td>2.12</td>
<td>2.04</td>
</tr>
<tr>
<td>(SD)</td>
<td>(.464)</td>
<td>(.358)</td>
<td>(.448)</td>
<td>(.358)</td>
</tr>
</tbody>
</table>

As the Table above indicates, as education level increased so did the competency ratings on the Sweeney-Clark rubric. Time 1 assessment, critical thinking, communication and nursing intervention mean scores on the Sweeney-Clark rubric for competencies were fairly low for all students. These scores rank sophomore students at levels “below novice” and junior and senior students at “advanced beginner” levels. Very few students at T1 reached Benner’s “competency level” (designated at level 3 on the rubric). In fact, sophomore students received scores that were below minimum (-1.00). This occurred because even with multiple prompts, the students were unable to meet the novice level of competency as designated by the rubric. Junior and seniors ranked at novice or at advanced beginner level regarding competencies with only 8.8% of the sample ranking at an acceptable level (3) of competency.
Although sophomores as a whole were unable to achieve level one competency on the rubric, it was important to note that participants in this particular group were first semester sophomore students who were beginning their first clinical course in nursing. Thus, while their level of achievement had not been anticipated, their scores seemed reasonable given their lack of experiences in clinical nursing.

For juniors and seniors, the majority of students were rated at level 2 (advanced beginner) on the scale while very few students obtained a level 3 (competent). The data showed that 14% of the sample rated under level 1, 28% rated at 1.00 (novice), 52.6% rated 2 (advanced beginner) and 5.3% were rated as a level 3 (competent) using the Sweeney-Clark rubric based upon Benner’s (1984) from novice (1) to expert (5). Mean scores for each level of student shown in Table 6.
Table 6

*Sweeney-Clark Rubric Scores (Mean) by Level of Student*

<table>
<thead>
<tr>
<th>Sweeney Rubric</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sophomore</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>1.46</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 2</td>
<td></td>
<td>2.53</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 3</td>
<td></td>
<td></td>
<td>3.42</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Senior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>2.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 2</td>
<td></td>
<td>2.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 3</td>
<td></td>
<td></td>
<td>3.14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Paired t-tests were computed to see if there were statistically significant differences between means and to compare the Sweeney-Clark rubric scores across the three designated time intervals (T1, T2, and T3). Because multiple t-tests were run on the same data set, the Bonferroni correction was applied, changing the alpha level from $p=0.05$ to $p=0.02$ ($p=0.05/3 = 0.0166 = 0.02$). Findings noted a significant difference in the assessment scores between T1 and T2 ($t = 11.24$, $p=0.000$). For communication scores, significant differences were found between T2 and T3 ($p=0.000$) and for nursing interventions, significant differences were found between T1 and T2 ($p=0.000$); T2 and T3 ($p=0.002$) and T1 and T3 ($p=0.000$). Table 7 below presents the results of the paired t-tests of the Sweeney Clark Rubric scores.
Table 7

*Paired t-test and Paired Samples Differences (T1, T2 and T3)*

<table>
<thead>
<tr>
<th>Competencies by Sample</th>
<th>t statistic</th>
<th>Sig. (p&lt;0.02)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-11.2</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-1.59</td>
<td>.137</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-0.739</td>
<td>.002</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-6.63</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.42</td>
<td>.032</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-6.20</td>
<td>.000</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-10.1</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-1.29</td>
<td>.000</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>4.64</td>
<td>.219</td>
</tr>
<tr>
<td>Nursing Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-7.60</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-3.95</td>
<td>.002</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-9.79</td>
<td>.000</td>
</tr>
</tbody>
</table>
Table 8

*Paired t-test and Paired Sample Differences (T1, T2, and T3) Junior and Senior Level*

<table>
<thead>
<tr>
<th>Competencies by Education Level</th>
<th>t statistic</th>
<th>Sig (p&lt;.02)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Junior</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment –JR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-10.07</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.73</td>
<td>.041</td>
</tr>
<tr>
<td><strong>T1 to T3</strong></td>
<td>-5.39</td>
<td>.003</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-6.26</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.15</td>
<td>.084</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-5.39</td>
<td>.003</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-10.12</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.71</td>
<td>.042</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-7.00</td>
<td>.001</td>
</tr>
<tr>
<td>Nursing Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-6.25</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-3.87</td>
<td>.012</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-13.0</td>
<td>.000</td>
</tr>
<tr>
<td><strong>Senior</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment –SR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-2.57</td>
<td>.017</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-1.46</td>
<td>.203</td>
</tr>
<tr>
<td><strong>T1 to T3</strong></td>
<td>-2.71</td>
<td>.042</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-2.02</td>
<td>.000</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.71</td>
<td>.056</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-2.73</td>
<td>.042</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-3.76</td>
<td>.001</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.23</td>
<td>.076</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-7.00</td>
<td>.001</td>
</tr>
<tr>
<td>Nursing Intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 to T2</td>
<td>-3.53</td>
<td>.002</td>
</tr>
<tr>
<td>T2 to T3</td>
<td>-2.00</td>
<td>.102</td>
</tr>
<tr>
<td>T1 to T3</td>
<td>-3.79</td>
<td>.013</td>
</tr>
</tbody>
</table>
Using a paired t-test to compare by student level for T1, T2 and T3, findings showed statistically significant differences (Table 8). In the comparison of juniors the aggregate data showed for assessment of T1 to T2 ($t$-10.07, $p=0.000$) and of T1 to T3 ($t$-5.39, $p=0.003$) significant differences in the competency scores. In T2 to T3 scores for assessment, critical thinking and communication there were no significant differences in the competency scores. The critical thinking data (Table 8) like assessment and communication shows a trend in that there were significant differences in the competency scores on the Sweeney-Clark rubric for junior students at T1 to T2 and T1 to T3 experiences. For nursing intervention competency scores there were significant differences in T1 to T2 (-6.25, $p=0.000$), T2 to T3 ($t$-3.87, $p=0.012$) and T1 to T3 ($t$-13.0, $p=0.000$).

In the comparison of competency data for senior students, reflected in Table 8, there were significant differences in the assessment scores for T1 to T2 ($t$-2.57, $p=0.017$). There were not significant differences in the scores for assessment for T2 to T3 or T1 to T3. In the category of critical thinking as seen in the area of assessment data T1 to T2 ($t$-2.02, $p=0.000$), this data were the only scores to show significant differences. For seniors in the areas of communication and nursing intervention, there were significant differences in the data for T1 to T2 ($t$-3.76, $p=0.001$) ($t$-3.53, $p=0.002$) and T1 to T3 ($t$-7.00, $p=0.001$) ($t$-3.79, $p=0.013$). There were no significant differences in the data for T2 to T3 for either communication or nursing interventions.

During Time 2, only junior and senior students ($n=48$) were represented in the sample. Assessment, critical thinking, communication, and nursing intervention mean scores on the Sweeney-Clark rubric ranged from 2.4 to 2.7 (Table 8). Based upon these competency scores, students were at the “advanced beginner level” of proficiency on these various measures.
Table 9

*Time Two (T2) Means and Standard Deviations*

<table>
<thead>
<tr>
<th>Time two (T2) Ed. Level</th>
<th>Assessment Mean (SD)</th>
<th>Communication Mean (SD)</th>
<th>Critical Thinking Mean (SD)</th>
<th>Nursing Intervention Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior</td>
<td>2.70 (.464)</td>
<td>2.58 (.503)</td>
<td>2.45 (.508)</td>
<td>2.41 (.503)</td>
</tr>
<tr>
<td>Senior</td>
<td>2.85 (.534)</td>
<td>2.57 (.513)</td>
<td>2.42 (.513)</td>
<td>2.71 (.611)</td>
</tr>
</tbody>
</table>

Time 3 consisted of a random sample of 20% of junior and seniors who had participated during Time 1 and Time 2 in the study (n=10). Students were evaluated during actual clinical experiences using the Sweeney-Clark rubric using the same competency measures. Table 9 shows the means and standard deviations for Time 3 data.

To evaluate transfer of competencies to the clinical setting, 20% of the sample was randomly chosen to be rated in the clinical setting after completing the two T1 and T2 simulation experiences. Time 3 assessment, communication, critical thinking, and nursing intervention mean scores were 3.2; 3; 3.1; and 3.2 respectively, on the Sweeney-Clark rubric for competencies. These scores placed students in the competent level that “sees the basic picture”. Importantly, these scores increased from both T1 and T2 competency measure on the Sweeney-Clark rubric in all areas.
Table 10

*Time Three (T3) Means and Standard Deviations*

<table>
<thead>
<tr>
<th>Time three (T3) Ed. Level</th>
<th>Assessment</th>
<th>Communication</th>
<th>Critical Thinking</th>
<th>Nursing Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Junior n = 5 mean</td>
<td>3.66</td>
<td>3.50</td>
<td>3.33</td>
<td>3.33</td>
</tr>
<tr>
<td>(SD) (.516)</td>
<td>(.836)</td>
<td>(.103)</td>
<td>(.516)</td>
<td></td>
</tr>
<tr>
<td>Senior n= 5 mean</td>
<td>3.20</td>
<td>3.00</td>
<td>3.13</td>
<td>3.26</td>
</tr>
<tr>
<td>(SD) (.560)</td>
<td>(.845)</td>
<td>(.743)</td>
<td>(.457)</td>
<td></td>
</tr>
</tbody>
</table>

The results of ANOVA for nursing intervention were typical of the findings for all competencies (assessment, nursing intervention, critical thinking, and communication). Time 1 paired with educational level (f 23.467, p=0.000) indicated a significant difference in values between the Sweeney-Clark competency and the student’s educational level. There was a positive relationship between competency scores on assessment, communication, and critical thinking and nursing intervention with educational level. The nursing intervention scores on the Sweeney–Clark rubric showed competency increased between T1 to T2 to T3 but the increase was dependent on educational level. There was a high level of difference in scores between T1 and T3, and a smaller change between T2 and T3. In general, the higher the educational level of the student, the higher the competency scores were using the Sweeney-Clark rubric for assessment, communication, critical thinking, and nursing intervention.
Assessing the number of simulation experiences of participants prior to the study allowed for an evaluation of the impact of those events on competency scores at Time 1. Table 11 identifies competencies affected by numbers of simulation experiences. Significant differences were only noted during Time 1. The significant p value supported differences in the competencies as a factor of numbers of simulation experiences in the sample population. In general, those persons with few simulation exposures prior to the T1 observation had lower competency scores on the Sweeney Clark rubric.

Table 11

<table>
<thead>
<tr>
<th>Number of Simulation</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig. (p=0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 between groups</td>
<td>9.5</td>
<td>12.3</td>
<td>.000</td>
</tr>
<tr>
<td>Within groups</td>
<td>.773</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Critical Thinking:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 between groups</td>
<td>11.4</td>
<td>14.3</td>
<td>.000</td>
</tr>
<tr>
<td>Within groups</td>
<td>.796</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Communication:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 between groups</td>
<td>2.3</td>
<td>4.24</td>
<td>.024</td>
</tr>
<tr>
<td>Within groups</td>
<td>.55</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nursing Interventions:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1 between groups</td>
<td>2.66</td>
<td>5.62</td>
<td>.008</td>
</tr>
<tr>
<td>Within groups</td>
<td>.473</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NLN Satisfaction and Self-Confidence in Learning Questionnaire Results*

The NLN Satisfaction and Self-Confidence Learning Questionnaire were administered following each high fidelity simulation experience (Time 1, Time 2, and Time 3). As noted previously, this was a 13 item self-report scale instrument designed to measure perceived satisfaction and self-confidence after a simulation experience. The NLN satisfaction scale was
designed as a Likert-type scale with 1 (strongly disagrees) to a 5 (strongly agrees). The questions related to satisfaction with current learning and self-confidence in learning.

Mean satisfaction scores for T1 ranged from 4.1 to 4.2 on the NLN Satisfaction and Self-Confidence questionnaire. The mean T1 self-confidence scores ranged from 3.4 to 4.4 on a 5 point rating scale. For T1 the sample size was 57, with sophomore, junior and senior participants in the sample. While in general, the competency scores for the sample were low, the self-rated satisfaction and self-confidence items were rated with high scores by the participants.

Time 3 satisfaction and self-confidence scores from the NLN questionnaire produced mean scores for satisfaction from 4.4 to 4.5 and self-confidence mean scores 4.1 to 4.4. Scores at Time 3 were similar to Time 2 scores, suggesting that students rated consistently high on self-confidence and satisfaction which indicated they were satisfied with the educational modality. During Time 3, students in the junior and senior levels showed competency in the clinical setting along with a great deal of satisfaction in their learning. They also indicated an uncertainty and only a moderate level of self-confidence in their knowledge and abilities (Tables 12 and 13).

**Table 12**

<table>
<thead>
<tr>
<th></th>
<th>T2 mean scores</th>
<th>T3 mean scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>4.1</td>
<td>4.4</td>
</tr>
<tr>
<td>Self-confidence</td>
<td>4.1</td>
<td>4.1</td>
</tr>
</tbody>
</table>

**Table 13**

<table>
<thead>
<tr>
<th></th>
<th>T2 mean scores</th>
<th>T3 mean scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>4.4</td>
<td>4.5</td>
</tr>
<tr>
<td>Self-confidence</td>
<td>4.2</td>
<td>4.4</td>
</tr>
</tbody>
</table>
Interestingly, satisfaction and self-confidence scores from the NLN Satisfaction/Self-Confidence in learning scale remained at a high level for both juniors and seniors no matter what the competency scores. This suggested that the level of competency and satisfaction and self-confidence were not necessarily related. Students in this study reported being satisfied or liking the experience and being self-confident in their learning throughout the T1 experience.

A paired t-test was computed comparing the NLN Satisfaction/Self-confidence scale scores across the three designated time intervals (T1, T2, and T3). Table 14 shows the results. For the sample as a whole, the only significant difference in satisfaction scale scores occurred between Time 1 and Time 3 (t = -2.92, p=0.011) indicating that students were less satisfied at Time 3 than at Time 1. Importantly, only juniors and seniors remained in the sample at Time 3, suggesting that sophomores may have been especially satisfied with the simulation experience. For self-confidence, the only significant difference in scale scores occurred between Time 1 and Time 3 (t= 2.48, p=0.029) supporting the idea that student self-confidence had increased along with their improved proficiencies.

| Table 14 |
|---|---|---|
| **Paired t-test Satisfaction/Self-confidence T1, T2, T3** |
| Satisfaction by Time | t statistic | Significance (p<.02) |
| Satisfaction | | |
| T1 to T2 | -1.08 | .284 |
| T2 to T3 | -1.09 | .294 |
| T1 to T3 | -2.92 | .011 |
| Self-confidence | | |
| T1 to T2 | -1.77 | .082 |
| T2 to T3 | -2.367 | .719 |
| T1 to T3 | 2.48 | .029 |

Correlation coefficients were analyzed to see if there was any relationship between age and level of satisfaction in the study. Total satisfaction scores at Time 1 were correlated with age
and findings noted a moderately negative significant correlation between these factors \( r = -0.34 \) \( p = 0.05 \). Findings suggested that the younger the student, the greater the satisfaction as noted on the NLN questionnaire. Young students (sophomores in this study) were very excited about starting their clinical and simulation experiences. This excitement and enthusiasm might have translated into greater satisfaction while engaging in simulation and clinical experiences. There were no significant differences during Time 2 or Time 3 in level of satisfaction by age. This might have been a function of not having sophomore participants in the study during Time 2 or Time 3. Perhaps junior and senior nursing students did not feel as excited about clinical experiences because they were not as novel to them as they are during the beginning of a student nursing experience. When the NLN measure of self-confidence was analyzed for a relation with age, no significant findings were identified.

*Qualitative Findings*

The students wrote comments on their evaluations. The comments were categorized into three different themes. The first was that simulation experience would help students function in the clinical environment with “real patients”. The majority of students (87%) (sophomores, juniors, and seniors) during Time 1 commented that simulation would help them in clinical situations. During Time 2, (72% to 87%) of junior and senior level students reported a positive belief that simulation would be helpful in the clinical setting. During Time 3, 92% of junior and seniors reported during their clinical experience that simulation helped them be better clinicians.

The second theme arising from student comments was that simulation gave students “more self-confidence in providing care for patients in a clinical setting.” During Time 1, the majority of sophomore, junior, and senior students (89%) reported feeling more self-confident because of simulation experiences. At Time 2, 67% to 89% reported similar thoughts about self-
confident and during Time 3, 90% of junior and senior students reported that simulation made them more self-confident in the clinical setting.

The last theme identified was that “simulation was a positive experience”. Time 1 data noted 91% of sophomores, juniors, and seniors indicated the experiences to be positive. During Time 2, 73.3% of juniors and seniors reported simulation to be positive. During Time 3, 86% of junior and senior students commented that simulation was a positive experience.

**Application to Research Question and Objectives**

Using a repeated measures design, each student served as their own control in this research study designed to determine if there was a change in assessment, critical thinking, communication, nursing interventions, satisfaction, and self-confidence as a result of exposure to simulation pedagogies. Sophomore students (n=9) demonstrated in the first (T1) simulation that even with multiple prompts from faculty throughout the simulation experience most students did not reach the novice level (Benner (1984) model of novice to expert) (see Table 5). This finding is different from reports in the literature (Fellner, 2009; Jefferies, 2007, 2009; Perron & Sullivan, 2009). The literature demonstrated that students previously tested using this model achieved a score from one to four indicating novice to expert. The samples from the literature were mostly cohorts of juniors and seniors. The students in this study were examined in simulation by educational level (sophomores, juniors, and seniors). The analysis was between levels and within levels. These students at sophomore level were first semester clinical students in their fundamentals course. They were just beginning their first skills lab in nursing and just beginning their first clinical experience. After reviewing the data from this sophomore cohort it was reasonable to expect that a beginning student experiencing their first simulation experience would not achieve at a novice level. At this point in their skills training the student could just
begin to assess vital signs. The decision making abilities at this point are very weak and not at the novice level. These students, because of their lack of clinical experiences, would be expected to have minimal competencies even at the novice level. In retrospect it would have been better to have excluded this group of students from the study at least until the next semester (second semester sophomore) after their beginning skills were strengthen.

The data as shown in Tables 5, 9, and 10 supported the expectation that as the educational year of the student increased with exposure to simulation, the competencies as rated on the Sweeney-Clark rubric (assessment, communication, critical thinking, and nursing interventions) increased over time. Table 5, 6, 9, and 10 illustrate this trend.

Simulation experiences can contribute to an increase in clinical experiences for students, especially in rural areas. In this study the use of simulation introduced into the curriculum expanded simulation experiences in the curriculum from one per semester to two experiences per semester. This increase was to be seen from sophomore to senior level. The literature (Brown & Hanberg, 2006; Jefferies, 2007, 2009; Lisko, 2010; Medley & Horne, 2005) suggests that high fidelity simulation would be an excellent venue to assist in increasing students’ clinical experiences. These experiences would take place within a safe, replicable learning environment because of the use of simulation. The literature noted (Traynor et al., 2010) that when simulation was used as a clinical vehicle, students retained material longer and that competencies as well as self-confidence and satisfaction increased. This was true of this study as illustrated in Tables 5, 9, and 10.

Paired t-tests of T1 to T2 results supported the data shown in Table 7 and Table 8. The T1 to T2 assessment mean was 1.65 and was calculated with the sample (n=48). The paired t-test for T2 assessment mean was 2.76 with the same population (n=48). These numbers supported the
observed increase of competency in the area of assessment throughout the study. Similar results were seen for communication, critical thinking and nursing interventions.

The anticipated result from the literature (Brown & Hanberg, 2006; Hardner, 2010; Jefferies, 2007, 2009; Traynor et al., 2010) for students’ self-confidence and satisfaction in relationship to simulation experiences was that both satisfaction and self-confidence would increase with simulation exposure. This would be indicated by an increased NLN Satisfaction, Self-Confidence questionnaire scores. The data for satisfaction and self-confidence (Tables 12, 13, and 14) in this study did not coincide with what is found in the literature. The mean scores for T1 total satisfaction and self-confidence for all groups of students were high but with very little variance (refer to Tables 12, 13, and 14 under the column for satisfaction and self-confidence). The same trend was seen in T2 and T3 (Tables 12, 13, and 14 as above). The paired t-tests indicated that the differences for self-confidence and satisfaction in the mean scores were small. The ANOVA analysis with p-value indicated that for self-confidence the differences between T1 to T2 and T2 to T3 were not statistically significant. For the paired t-tests for satisfaction as calculated with the sig (p) value there were no differences between T1 to T2 or T2 to T3. The statistically significant differences were in T1 to T3 satisfaction scores (p=0.011). When contrasting the total satisfaction scores and the total self-confidence scores in an ANOVA analysis, between all groups and within all groups of data, all p-values were greater than 0.05. The F statistics for the corresponding p-values, which concluded the sample, had little differences. Therefore, statistically significant differences were not noted.

The sample population in this study had high satisfaction and self-confidence scores on the NLN questionnaire from T1 to T2 to T3. Within this study population low competency scores on the Sweeney-Clark rubric did not impact adversely on feelings of satisfaction or self-
confidence. Students with high competency scores also had high satisfaction and self-confidence scores (Table 5, 12, and 13). This was contrary to what the literature had suggested. Further study is indicated.

This study also evaluated whether students would be able to carry over knowledge, skills, and self-confidence experienced in the simulation environment into the actual clinical setting with “real patients”. The same rubric and questionnaire were used for T3 in which students were observed in a clinical setting and rated using these measures. When means and standard deviations were compared between T2 and T3, junior students improved using Benners’ (1984) model from advanced beginner to competent in all areas (assessment, communication, critical thinking, and nursing interventions – see Tables 8, 9, and 10). The results and analysis for senior level students was similar as seen in Tables 8, 9, and 10.

According to Benner’s model the junior and senior student population at T2 performed at the advanced beginner level of competency scores. After having two simulation experiences the students (20% of the T2 population) in T3 were evaluated using the same rubric and questionnaire in the clinical setting. Students in the clinical setting scored a performance of 3.0 or higher on the competent range. They also rated at least a 4.0 or above in the areas of satisfaction and self-confidence out of the five point Likert scale.

Students in general appeared excited and had enthusiasm about all of the simulation experiences. This was shown with relatively high scores for satisfaction and self-confidence from the NLN questionnaire. These scores remained high even when competency levels were lower (novice level) as seen in (T1) time one simulation experiences.
Simulation labs are a new entity at this School of Nursing. Much attention has been paid in getting students excited about the process and the potential experiences. It is likely this fact had an effect on satisfaction scores.

The scores on the Sweeney-Clark rubric were used to evaluate core program outcomes (assessment, communication, critical thinking, and nursing interventions) for the juniors and seniors during the semester of the study. Only aggregate data were assessed. This gave the Department hard quantitative data to review as an indicator of core competencies for program evaluation. It was found to be an effective measure in this process. The literature (Gantt, 2010) showed that the Sweeney-Clark rubric was an effective tool in measuring student competencies for assessment, communication, critical thinking, and nursing interventions. Taking this evaluation process one step further provided data for core competencies evaluated within the School of Nursing. These areas of evaluation are assessment, communication, critical thinking, and nursing intervention. This study suggested that the Sweeney-Clark rubric may have the potential to assess the individual student, the cohort of level of student, or the total group of students in many areas of outcome measures with quantitative data.

Limitations, Recommendations, and Implications for Change

A limitation of this study was that sophomore students only had one simulation experience during data collection (one semester) T1. As a result there were missing data for sophomores for T2 and T3. This occurrence had not been anticipated by the investigator. The investigator did not have input to the simulation schedule.

The sample size was 57 out of a total student population of sophomores, juniors, and seniors of 78. It was thought that more students would have volunteered to participate when given the opportunity. A smaller sample size increased the possibility of error in the data.
Because of the small sample size it was important not to over generalize the interpretation of the results. A recommendation would be to repeat this study with a larger sample.

A positive crossover effect from simulation to the clinical setting has been suspected but there has been little data to confirm this. This study suggested that simulation does increase clinical competencies in the areas of assessment, critical thinking, communication, and nursing interventions and those students find increased self-confidence and satisfaction in the clinical setting due to their experiences in simulation.

The NLN Satisfaction/Self-Confidence questionnaire utilized in this study measured the students’ level of satisfaction and self-confidence with the learning process (See Appendix B). The focus of the questionnaire was on how students perceived the instructor as having assisted them in learning. It was recommended that a satisfaction/self-confidence questionnaire be designed specifically to be used with simulation. Students made antidotal expressions as to satisfaction and self-confidence in post simulation and post clinical debriefing sessions as well as at the bottom of their questionnaires. Most of the antidotal comments were positive. Students expressed that they felt simulation helped them in clinical experiences with real patients. They also commented that simulation gave them more self-confidence in providing care for patients in a clinical setting. Comments focused on simulation as being a positive experience. When the simulation experience was especially challenging or the student was unprepared, satisfaction and self-confidence levels were evaluated lower. Thus, simulation experiences need to be carefully planned and executed to enhance the students feeling of satisfaction and self-confidence in order to have a positive effect in the clinical setting.

Because of the positive results of this study and its implication for change, WVWC planned to increase the number of simulation experiences within the curriculum. Schools of
nursing should incorporate simulation into their curriculum thoughtfully and carefully plan to increase these experiences across the program. To include simulation need to involve total faculty in the process with training to ensure buy in, reliability, and cooperation of the faculty.

The Sweeney-Clark rubric has been shown by the literature and by this study to be an effective tool to use to evaluate students both in simulation experiences and in the clinical setting (Clark, 2006; Gantt, 2010; Lisko, 2010; Sweeney, 2011). Through analysis of the data, the tool may be used for individual or for aggregate scores. If aggregate scores are evaluated, this evaluation will show that the rubric is effective to provide data to use for core competency in evaluation of program outcomes. Having an effective tool for program evaluation in nursing education would prove a valuable asset. It is recommended that a replication study be done with a larger sample population, and that nursing programs pilot use of the Sweeney-Clark rubric for program evaluation.

Summary

In summary, the identified area of interest for this outcomes research project was simulation in nursing education. This project evaluated nursing students’ level of competency in the areas of communication, critical thinking, assessment, and nursing interventions using the Sweeney-Clark’s rubric and found that with simulation experiences these competences increased over time. The NLN (2005) Student Satisfaction and Self-Confidence in Learning Scale and a Demographic survey were also administered.

The Sweeney-Clark rubric (2009) was designed to score performance in the areas of assessment, critical thinking, communication, and nursing interventions. The results showed significance in improving nursing students’ scores in those areas and also supported the use of this tool as being effective for program evaluation for nursing school core concepts. The project
evaluated whether or not the observed changes carried over to the clinical setting. Findings supported a positive crossover effect from simulation to the clinical setting. Competency scores increased from simulation to clinical. Students also reported anecdotally that simulation helped them feel more self-confident with real patients.

This study supported the works of others that have suggested simulation had a role in increasing students’ competencies and skill acquisition as well as enhancing students’ confidence and satisfaction in learning. Further, this project advanced what was known about simulation as pedagogy by addressing the question as to whether knowledge and skills acquired in simulation learning environments transferred to the clinical settings.
References


Finance in Health Care [www.IOM.gov](http://www.IOM.gov)


human patient simulation. *Educational Innovations*April, 46(4).


NY: NY National League for Nursing.


Sudbury, MA: Jones & Bartlett.


Appendix A
Capstone Project DNP Program Regis University

Permission granted by authors to use rubric July 9, 2011.

Clinical Simulation Grading Rubric (Sweeney-Clarks Rubric)

<table>
<thead>
<tr>
<th>Category</th>
<th>1. Doesn’t see the picture</th>
<th>2. Sees part of the picture</th>
<th>3. Sees the basic picture</th>
<th>4. Sees the big picture</th>
<th>5. Anticipates the changing picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Assessment/Reassessment</td>
<td>Novice</td>
<td>Advanced beginner</td>
<td>Competent</td>
<td>Proficient</td>
<td>Expert</td>
</tr>
<tr>
<td></td>
<td>Performs assessment with guidance/prompts</td>
<td>Distinguishes between abnormal &amp; normal assessment findings</td>
<td>Classifies relative importance of assessment findings</td>
<td>Recognizes signs of patient deterioration</td>
<td>Relates ongoing assessment findings to potential complications</td>
</tr>
<tr>
<td>History Gathering</td>
<td>Recalls questions for basic history data with guidance/prompts</td>
<td>Discriminates between normal and abnormal history data</td>
<td>Uses understanding of disease process to focus questions</td>
<td>Includes past medical history to develop basis for comparison with current condition</td>
<td>Anticipates potential outcomes based on history findings</td>
</tr>
<tr>
<td>Critical Thinking/Clinical judgment</td>
<td>Verbalizes expected norms in patient condition</td>
<td>Recognizes variations in patient condition, but needs help in prioritizing</td>
<td>Determines priorities in patient care based on variations in patient condition</td>
<td>Carries out care while managing multiple contingencies</td>
<td>Devises plan to avoid complications</td>
</tr>
<tr>
<td>Lab data &amp; diagnostic studies</td>
<td>Reports lab data</td>
<td>Distinguishes between normal and abnormal lab data or exam</td>
<td>Uses understanding of lab values to plan</td>
<td>Analyses trends in lab values and compares with patient</td>
<td>Monitors patient response through analysis of lab data and exam</td>
</tr>
<tr>
<td>collection</td>
<td>findings</td>
<td>care</td>
<td>response</td>
<td>findings</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------</td>
<td>------</td>
<td>----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td><strong>Patient Teaching</strong></td>
<td>Seeks guidance to answer patient/family questions</td>
<td>Explains procedures to the patient/family</td>
<td>Rephrases medical information into lay terms for patient/family</td>
<td>Identifies need for further patient/family teaching</td>
<td>Modifies patient teaching methods based on pt./family response</td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td>Recalls basic information for report to physician/colleagues with prompting</td>
<td>Summarizes available information for report to physician/colleagues</td>
<td>Prioritizes available information for report to physician/colleagues</td>
<td>Draws conclusions based on available information for report to physician/colleagues</td>
<td>Synthesizes available information with possible future patient outcomes for report to physician/colleagues</td>
</tr>
<tr>
<td><strong>Nursing Interventions</strong></td>
<td>Performs simple, basic nursing care with prompts</td>
<td>Identifies active patient problems: but needs help in selecting interventions</td>
<td>Implements appropriate routine interventions and evaluates effect; may delegate</td>
<td>Implements appropriate nursing interventions plan in timely manner: consistently delegates</td>
<td>Modifies nursing care by synthesizing evidence-based knowledge into practice: utilizes and/or conducts research</td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td>Identifies patient with single identifier: sanitizes hands with prompts</td>
<td>Identifies patient with 2 identifiers: sanitizes hands: employs universal precautions, recognizes unsafe equipment or situations and</td>
<td>Identifies with 2 identifiers: sanitizes hands: employs universal precautions, recognizes unsafe equipment or situations and</td>
<td>Uses &gt; 2 identifiers and actively incorporates patient, environment and procedural safety standards of care</td>
<td>Synthesizes patient safety assessment and standard of care to devise multidisciplinary plan for optimal patient safety and health care team member protection</td>
</tr>
</tbody>
</table>
Areas for improvements:

Strengths:

Student______________________ Date_________ Course_______Datatel #_______

Simulation #1  #2  or  Post simulation clinical experience

Level:  Soph.  Jr.Sr.

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7/9/2011
Appendix B

Student Satisfaction and self-Confidence in Learning Scale

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>UN</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The teaching methods used in this simulation were helpful and effective.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>3. I enjoyed how my instructor taught the simulation.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>4. The teaching materials used in this simulation were motivating and helped me to learn.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>5. The way my instructor(s) taught the simulation was suitable to the way I learn.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>7. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>9. My instructors used helpful resources to teach the simulation.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>10. It is my responsibility as the student to learn what I need to know from this simulation activity.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>11. I know how to get help when I do not understand the concepts covered in the simulation.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>12. I know how to use simulation activities to learn critical aspects of these skills.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
<tr>
<td>13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time.</td>
<td>0 1</td>
<td>0 2</td>
<td>0 3</td>
<td>0 4</td>
<td>0 5</td>
</tr>
</tbody>
</table>

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Revised December 22, 2008
### Appendix C

**Logic Model: Evaluation Plan**

#### Logic Model Development

<table>
<thead>
<tr>
<th>Strategies #5</th>
<th>Assumptions #6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simulation lab experiences using rubric for assessment (evidence based interventions).</td>
<td>- student’s self-confidence/satisfaction will be positive impact. Student clinical abilities measures with Sweeney-Clark’s tool in area of: communication, critical thinking, nursing interventions, assessment</td>
</tr>
</tbody>
</table>

#### Influential Factors #4

<table>
<thead>
<tr>
<th>Problem or Issue #1</th>
<th>Desired Results (outputs, outcomes, and impact) #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>C: students own control group multi-measure with same students, change due to increased exposure via high-fidelity simulation</td>
<td></td>
</tr>
<tr>
<td>O: BSN nursing students will show an improvement in scores on critical thinking, communication,</td>
<td></td>
</tr>
<tr>
<td>Resources</td>
<td>Activities</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
</tr>
<tr>
<td>Evaluation Logic Model Guide, W.K. Kellogg Foundation, Page 54</td>
<td>In order to address our problem or asset we will accomplish the following activities:</td>
</tr>
<tr>
<td>BSN students to do clinical simulation within our nursing program.</td>
<td>-permission to use Sweeney- Clarks Rubric</td>
</tr>
<tr>
<td>Faculty #3 to run</td>
<td>-establish inner rater reliability between</td>
</tr>
<tr>
<td>Simulation and 2 to evaluate students with rubric.</td>
<td>two faculty</td>
</tr>
<tr>
<td>Permission to use rubric</td>
<td>IRB approval</td>
</tr>
<tr>
<td>Simulation lab at WVWC</td>
<td>Do simulation experiences using Sweeney-Clarks rubric</td>
</tr>
</tbody>
</table>

Simulation will be refined. Will be able to increase # of students and # of faculty in BSN, MSN and develop a DNP program to help the department grow within the college.
### Appendix D

#### Cost-Benefit Analysis

<table>
<thead>
<tr>
<th>Indirect expenses</th>
<th>Benefit analysis</th>
<th>Cost of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct expenses</td>
<td>No grants No funding Paid by investigator</td>
<td>No grants No funding paid by investigator</td>
</tr>
<tr>
<td>Cost of intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facility cost for intervention</td>
<td>In kind</td>
<td>In kind</td>
</tr>
<tr>
<td>Equip. for intervention, high-fidelity. Sims equipment already purchased</td>
<td>60,000</td>
<td>60,000 using existing equipment Sims., computers(no cost)</td>
</tr>
<tr>
<td>Remaining equip. cost: Supplies Paper Printing Printer ink cart.</td>
<td></td>
<td>$100. $300. $150.</td>
</tr>
<tr>
<td>Teaching simulation evaluation process skill to other faculty /student/M.D. salaries saving attributed to volunteers.</td>
<td>$20.00/ Hr. practice and simulation evaluation $1040. $30,000 half time faculty salary</td>
<td>$20.00/hr. practice and simulation rating. =$1040.</td>
</tr>
<tr>
<td>Nursing students need for access to safe clinical sites (local and state and national) 100%</td>
<td>Number of nursing students 57 total</td>
<td>Number of nursing faculty 6 full time</td>
</tr>
<tr>
<td>WVWC Profile</td>
<td>Local WVWC: 141 students Undergraduate 24 seniors, 24 juniors, 36 sophomores, 57 freshmen.</td>
<td>6 full time faculty (The director of BSN and MSN are included in that number) WVWC student faculty ratio 24:1, WV state student faculty ratio 1:15. State: 2% of the workforce or RN’s are employed as faculty in schools of nursing. (WV center for nursing 2010). 18,394 nurses (RN) employed in the state (WV). 437 nursing faculty in WV,(WV center for nursing,2010).</td>
</tr>
</tbody>
</table>

Total cost of intervention projected: $550.00 Annual savings (Benefit): $31,040

Possible annual cost savings of the intervention: $29,450
Appendix E

Informed Consent

August 23, 2011

Dear Participant:

You are being invited to participate in a study entitled, Capstone project: Simulation in Nursing Education: A tool for program evaluation. This study will take place from August 2011 until January 2012. The purpose of the study is to evaluate simulation performance in the areas of critical thinking, communication, assessment, nursing interventions using the Sweeney-Clark’s rubric. Sweeney-Clarks rubric measures critical thinking, nursing interventions, assessment and communication. Information from the NLN Student Satisfaction and Self-Confidence in Learning and demographic data will also be evaluated.

Participation in the study is voluntary. If you choose not to participate, you do not have to be rated during simulation. You may also discontinue participation at any time. Your class standing, course grades, or any other status will not be affected in any way by your decisions about participation.

You will be asked to give informed consent by signing a consent form.

All responses will be kept confidential and no names will be associated with responses. All study instruments and data collected will be kept in a locked file cabinet in Janet Withersty’s office and will be disposed of after a period of 1 year.

If you have any questions about this study, you may contact Janet Withersty at any time at: withersty@bobcats.wvwc.edu or (304) 473-8524. You may receive a copy of the findings of the study if you are interested.

Thank you for your support of this important research initiative,

Janet Withersty MS, RN, CNS doctoral candidate

Associate Professor of Nursing

WVWC School of Nursing
Simulation in Nursing Education: A Tool for Program Evaluation Informed Consent Form

I understand I have been asked to participate in a study of undergraduate student scores on a performance rubric within Simulation that will involve being observed during my simulation experience.

I understand that the risk could include feeling stressed that someone is observing me during simulation experiences. The benefits for me would include having a better understanding of how program evaluation works in the School of Nursing.

I understand that the possible alternative options may include not participating in the study and not be rated in the simulation experiences.

I understand that my responses will be kept confidential to the extent permitted by law and that I may request the results and interpretations when the study is completed. I understand that if I have any questions about the study or if I experience any discomfort or have any concerns that I would like to express, I may contact Janet Witherstey Assoc. Professor of Nursing.

I understand my participation is voluntary and I may withdraw at any point without penalty to myself. I acknowledge the content of this form has been explained and that I have had an opportunity to ask questions. I have been given a copy of this form.

I do consent to participate in this study.

Print Name___________________________________

Signature_________________________________________ Date

Datatal______________________________ Revised 8/20/2011
Appendix F

Materials to Submit

CITI Collaborative Institutional Training Initiative

Human Research Curriculum Completion Report
Printed on 5/19/2011

Learner: Janet Withersty (username: Withe096)
Institution: Regis University
Contact Information  Department: school of nursing
Email: withersty@bobcats.wvwc.edu

Social Behavioral Research Investigators and Key Personnel:

Stage 1. Basic Course Passed on 05/19/11 (Ref # 6033632)

<table>
<thead>
<tr>
<th>Required Modules</th>
<th>Date Completed</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>05/18/11</td>
<td>no quiz</td>
</tr>
<tr>
<td>History and Ethical Principles - SBR</td>
<td>05/19/11</td>
<td>4/4 (100%)</td>
</tr>
<tr>
<td>The Regulations and The Social and Behavioral Sciences - SBR</td>
<td>05/18/11</td>
<td>5/5 (100%)</td>
</tr>
<tr>
<td>Assessing Risk in Social and Behavioral Sciences - SBR</td>
<td>05/18/11</td>
<td>4/5 (80%)</td>
</tr>
<tr>
<td>Informed Consent - SBR</td>
<td>05/18/11</td>
<td>4/5 (80%)</td>
</tr>
<tr>
<td>Privacy and Confidentiality - SBR</td>
<td>05/18/11</td>
<td>4/5 (80%)</td>
</tr>
<tr>
<td>Regis University</td>
<td>05/18/11</td>
<td>no quiz</td>
</tr>
</tbody>
</table>

For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator

CITI Collaborative Institutional Training Initiative
Learner: Janet Withersty (username: Withe096)
Institution: Regis University
Contact Information  Department: school of nursing
Email: withersty@bobcats.wvwc.edu

Social Behavioral Research Investigators and Key Personnel:

Stage 1. Basic Course Passed on 05/19/11 (Ref # 6033632)

<table>
<thead>
<tr>
<th>Required Modules</th>
<th>Date Completed</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>05/18/11</td>
<td>no quiz</td>
</tr>
<tr>
<td>History and Ethical Principles – SBR</td>
<td>05/19/11</td>
<td>4/4 (100%)</td>
</tr>
<tr>
<td>The Regulations and The Social and Behavioral Sciences - SBR</td>
<td>05/18/11</td>
<td>5/5 (100%)</td>
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<td>Assessing Risk in Social and Behavioral Sciences - SBR</td>
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<td>4/5 (80%)</td>
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<td>4/5 (80%)</td>
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<td>Privacy and Confidentiality – SBR</td>
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<td>4/5 (80%)</td>
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<tr>
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<td>05/18/11</td>
<td>no quiz</td>
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For this Completion Report to be valid, the learner listed above must be affiliated with a CITI participating institution. Falsified information and unauthorized use of the CITI course site is unethical, and may be considered scientific misconduct by your institution.

Paul Braunschweiger Ph.D.
Professor, University of Miami
Director Office of Research Education
CITI Course Coordinator
Appendix G

Demographic Questionnaire

Your answers to the following questions will help the study researchers to analyze the test results.

Instructions: please fill out answers. Do not put your name. Please put your datatot number below.

Datatel # ____________

Age: ____

Gender: Male _____ or Female _____

Location of Primary Residence____________________________

Undergraduate_____ 

If undergraduate what level are you? Soph.____, Jr._______, Sr._______

Have you previously taken any Nursing course(s)?
   Yes ______ No ______

   If so, where did you take this/these course(s):__________________________

Have you ever taken a Nursing course that had a simulation component?
   Yes _____ No_____ 

   If so, where and when did you take this course ________________________

Have you had any simulation experiences other than in nursing courses?
   Yes___ No___

   If so where and what? _

How many simulation experiences have you had so far in your Nursing courses at WVWC?
   0-1experiences______, 2-3experiences______, 4-5experiences_______
   6-7experiences________, more than 7 experiences________

   In which courses did this occur? __________________


Appendix H

Data management

All instrument sheets and consent forms were filed in a secure (double locked file). The principal investigator and mentor were the only two people with access to this material. The principal investigator entered all of the data on the IBM SPSS (2011) data system on a secure computer. That was password protected and kept in a locked office. A backup system of a data book was kept of all information put into SPSS. Confidentiality was maintained at all times related to participants and data. All CITI ethical protocols were followed.
Appendix I

IRB Approval Letters from IRB Regis University and West Virginia Wesleyan College

IRB – REGIS UNIVERSITY

October 18, 2011

Janet Withersty

13 Meade Street

Buckhannon, W.V. 26201

RE:  IRB #: 11-304

Dear Janet:

Your application to the Regis IRB for your project “Simulation in Nursing Education: A Tool For Program Evaluation” was approved as an expedited study on October 18, 2011.

Supporting reference information from the chair: “…. Because you are collecting Datatel information that could be linked back to individual students, the study does not fall under an exempt category. Rather it is expedited under the Office of Human Research Protections Categories of Research #7 for survey studies. After your data comparison is finished, you must deidentify the data (destroy the Datatel numbers).

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be
resubmitted to the Regis IRB for approval. Projects which continue beyond one year from their starting date require IRB continuation review. The continuation should be requested 30 days prior to the one year anniversary date of the approved project’s start date.

In addition, it is the responsibility of the principal investigator to promptly report to the IRB any injuries to human subjects and/or any unanticipated problems within the scope of the approved research which may pose risks to human subjects. Lastly, it is the responsibility of the investigator to maintain signed consent documents for a period of three years after the conclusion of the research.

Sincerely,

Daniel Roysden, Ph.D.
Chair, Institutional Review Board

cc: Louise Suite, Ed.D.
Institutional Research and Review Board
West Virginia Wesleyan College

TO: Janet Teachout-Witherow, MS, RN, CNS doctoral candidate
FROM: Dan Martin, EdID, ATC
Chair, Institutional Research and Review Board
RE: Research Proposal WVWC 2012 – 001F
DATE: August 29, 2011

Your study “Capstone Project - Simulation in Nursing Education: A tool for program evaluation” is approved.

The approval is through this academic year. Please notify IRRB should you have any changes with the methodology or should you desire an extension.

Good luck with your project.

cc: Dr. Judy McKinney, Director, School of Nursing
Appendix J

Letters of Support

June 14, 2011:

Dear Jan,

I am pleased to write this letter in support of your DNP capstone project related to simulation in nursing education. The School of Nursing applauds your academic work in the DNP and your plans for the development and refinement of a simulation learning evaluation tool. The project supports our tool development and validation procedures through the administration of the evaluation tool in two settings—the simulation lab and the clinical setting. In addition, this project supports our systematic program evaluation and quality improvement plan.

Again, congratulations as you continue your work toward the DNP. If you require additional information please let me know.

Sincerely,

Dr. Judith McKinney
Director and Professor
School of Nursing
West Virginia Wesleyan
Buckhannon, WV 26201
mckinney@wvwc.edu
304-473-8224
To Whom It May Concern:

I am writing this letter of support for Janet Teachoo Witherby, a candidate for the Doctor of Nursing Practice degree at Regis University. Jan is in the final stages of her DNP program and completing her capstone research project to examine the effects of simulation experiences on nursing student performance, including whether instruction in the simulation lab transfers to the clinical setting. For her sample, Jan will be using both graduate and undergraduate nursing students at West Virginia Wesleyan College.

As the Director of the Master of Science in Nursing Program at West Virginia Wesleyan College, I fully support all of Jan's efforts and welcome her input and creative energy in working with our graduate students. Jan has been a colleague of mine for many years and she consistently does an outstanding job in all that she undertakes. I am thrilled she will be working with our graduate students in this exciting project.

I will help mentor Jan in any way that is needed throughout this experience. Jan's matriculation in the DNP program at Regis has been wonderful for our School of Nursing at West Virginia Wesleyan. Having the opportunity to share in Jan's experiences at Regis allows all of us to be on the cutting edge of what is new in doctoral education in nursing. Her work in the doctoral program has truly invigorated our Nursing Program here and we have all of you to thank.

In closing, please let me know how I can best help in the coming months. I very much look forward to the implementation and evaluation of this important work that Jan is undertaking.

Sincerely,

[Signature]

Susan R. Leggett, EdD, RN, BC, MAAP
Associate Professor and Director, MSN Program
leggett@wvwc.edu
Appendix K  Systematic Review of Literature
<table>
<thead>
<tr>
<th>Research Design</th>
<th>Sample size</th>
<th>Methodology</th>
<th>Level of Evidence</th>
<th>Evidence Strength</th>
<th>Evidence Quality</th>
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</thead>
<tbody>
<tr>
<td>Studen...</td>
<td>N=100</td>
<td>Quantitative</td>
<td>Level I</td>
<td>Strong</td>
<td>High</td>
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<td>Student...</td>
<td>N=84</td>
<td>Qualitative</td>
<td>Level II</td>
<td>Moderate</td>
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<tr>
<td>Faculty...</td>
<td>N=110</td>
<td>Mixed</td>
<td>Level III</td>
<td>Weak</td>
<td>Low</td>
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**Evidence Table Format**

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<thead>
<tr>
<th>Instrument</th>
<th>Developers</th>
<th>Used to review</th>
<th>Validity Values</th>
<th>Instruments used for nursing education</th>
<th>Mean score (N=68)</th>
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</thead>
<tbody>
<tr>
<td>K.Adamson et al.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.5</td>
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<td>S. Kardong-</td>
<td></td>
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<tr>
<td>Regis University.</td>
<td></td>
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</tr>
</tbody>
</table>

**Points of Evaluation**

- **Faculty**
- **Students**
- **Nurse Educators**

**Simulation and Debriefing**

- **Clinical Judgment**
- **Safety**
- **Retention**

**Rubric**

- **Simulation Simulation**
- **Evaluation**
- **Simulation Simulation Rubric**

**Future Research**

- **Theoretical�
- **Philosophical�
- **Pedagogical�
- **Technological�
- **Research**

**Limitations**

- **Methodological**
- **Statistical**
- **Theoretical**
- **Philosophical**
- **Pedagogical**
- **Technological**

**Conclusion**

Future research could address the need for further studies to enhance simulation and debriefing practices in nursing education.
Problem Recognition PICO I

Population: Underserved Bachelor of Science in Nursing (BSN) sophomore to senior student nurses at WVWC, a rural school of nursing who lacked adequate access to diverse clinical experiences with patients.

Intervention: High-fidelity simulation experience using Sweeney-Clark’s Rubric and Student Satisfaction and Self-Confidence in Learning Scale, National League for Nursing (NLN), (2005). This process became a part of WVWC program evaluation process.

Comparison: Each student served as their own control using a repeated measure design to determine if there is a change in critical thinking, assessment, communication, and nursing care interventions as a result of multiple exposures to simulation pedagogies.

Outcomes: BSN nursing students showed an improvement in scores on critical thinking, communication, assessment, and nursing interventions as measured using the NLN Student Satisfaction and Self-Confidence in Learning Scale (2005).

Needs Assessment II

In rural areas the need was great for nursing faculty and for access to clinical sites. Nursing students in rural programs are considered underserved in that they lack access to health care clinical sites for practice skills. Major stakeholders were the faculty and students of WVWC. Other stakeholders were the potential and actual patients these students cared for in clinical settings and patients these competent nurses will care for post-graduation. The project team consists of: the main investigator, clinical mentor, student advisor, committee chair, volunteers used in collecting data and the second rater. See cost/benefit analysis.

Planning V

Budget: see Appendix

Instruments: Demographic survey, Sweeney-Clark rubric competencies, NLN satisfaction/self-confidence survey.

Sims observations T1, T2, T3.

Goals/Objectives/Mission III

The goal of this project was to assess changes in students’ self-confidence, critical thinking, communication, nursing interventions, and patient assessments scores across multiple exposures to high fidelity simulation. The mission of this high fidelity simulation program was to deliver the highest quality of clinical experiences. Training of learners at various stages in their nursing education, core competencies, evaluation, satisfaction.

Utilizing and Reporting Results IX

Competencies increased over time, high satisfaction throughout, and a positive crossover effect from simulation to clinical. Will use as program evaluation for imbedded course and program evaluations. Defend dissertation and present study to faculty WVWC.

Giving meaning to the Data VIII

Quantitate means, SD, paired t-test, ANOVA, comparisons T1, T2, T3 competencies and satisfaction and self-confidence.

Qualitative satisfaction and self-confidence antedatal

VII Implementation

In this study, the independent variable, the use of high fidelity simulation lab technology as pedagogy for student learning, was examined for its effect on the dependent variables (critical thinking, assessment, communication and nursing interventions) as measured using the Sweeney Clark rubric (2009). Additionally, the dependent variables of student satisfaction and self-confidence in learning were evaluated across the study.

Planning for evaluation: VI

See Logic Model

Objectives, timeframes, and data collection quantitative and qualitative.