Featured Article

Comparison of Selected Teaching Strategies Incorporating Simulation and Student Outcomes

Elizabeth A. Swanson, PhD, RN
University of Iowa College of Nursing, Iowa City, IA 52242 USA

Anita C. Nicholson, PhD, RN
Coe College, Cedar Rapids, IA 52402, USA

Teresa A. Boese, MSN, RN, Ellen Cram, PhD, RN, Anita M. Stineman, PhD, RN, Kimberly Tew, BSN, RN
University of Iowa College of Nursing, Iowa City, IA 52242 USA

Abstract

Background: Teaching strategies need to engage learners and focus on active learning. The nursing faculty shortage challenges us to prepare competent students. Simulation has been suggested as an appropriate teaching strategy.

Method: The basic experimental posttest-only design of this study evaluated effects of three teaching strategies on the outcomes of performance and retention performance of intervention activities, student satisfaction and self-confidence, and educational practice preferences.

Results: Students' scores were significantly higher in retention performance than in first performance. There was a significant interaction effect for time and teaching strategy. Nursing education needs to focus on use of high-fidelity simulation as a teaching strategy.

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Background

In the intense and complex health care environment, nurses are frequently confronted with technological changes, high patient acuity, and management of complex illness (Ravert, 2004). Other challenges add to the dilemmas facing nursing, nursing education, and practice. With the nurse shortage, employers expect new graduates to transition quickly into an independent role of nurse after completing orientation programs. At the same time, the shortage of nursing faculty challenges us to provide students with appropriate preparation and clinical experiences to ensure competency. This series of events makes the role of the nurse educator even more crucial in assisting students to apply knowledge...
Numerous advantages have been documented for the use of simulations in nursing education. The major advantage is the ability of students to learn interactively and to practice in a safe situation that affords immediate feedback (Haskwitz & Koop, 2004; Rauen, 2004). Other advantages are self-paced learning, improved critical thinking skills, reinforcement of curriculum consistency among students, enhanced self-confidence in skills, and remediation capability for students (Jeffries & Rizzolo, 2006; Nehring & Lashley, 2004; Rauen, 2004). Similarly, Chickering and Gamson (1987) asserted that good education creates opportunities for active learning to engage students in the process. It is their premise that students “must talk about what they are learning, write about it, relate it to past experiences . . . [and] must make what they learn part of themselves” (p. 3). Learning is not passive. Other researchers also support active learning within the context of simulation. Jef fries and Rizzolo (2006) have contended that while additional empirical work needs to be done, simulation holds promise for nursing education because it provides the prospect for students to apply and integrate knowledge in a safe environment. In addition, Jeffries and Rizzolo suggested that coupling simulation with active learning and the opportunity for problem solving, followed by a reflective thinking experience, leads to increased student self-confidence, which will assist when students are caring for patients in the acute care setting. The intent of this work was to use simulation coupled with active learning as a means of preparing nursing students to ensure competency in practice. In addition, active learning approaches will assist them in applying knowledge from nursing and other disciplines in making independent decisions in practice and will be applicable to the practicing nurse in the clinical areas.

Nursing studies on high-fidelity simulation are increasing, but a key deficiency in the literature is capturing the growth of nursing student knowledge related to the use of this technology. The National League for Nursing (NLN)/Laerdal study (Jeffries & Rizzolo, 2006) identified a significant gap in the nursing simulation literature related to developing research strategies that measure the application of knowledge and performance of students. It attributed the lack of significant findings on knowledge gain to the fact that simulation focuses on the opportunity to apply knowledge in ways that the written pre—post test approach does not capture. Current high-fidelity simulation studies using paper-and-pencil tests to measure knowledge gain have not found a statistically significant difference in student knowledge growth scores between control and experimental groups (Griggs, 2002; Jeffries & Rizzolo, 2006; Ravert, 2004; Scherer, Bruce, & Runkawatt, 2007). Because of the inability of current instruments to measure performance, new instruments need to be developed to test application of knowledge.

Theoretical Framework

Student engagement theory (Astin, 1984; Chickering & Gamson, 1987; Kuh, 2001) and the NLN/Laerdal framework for design, implementation, and evaluation of simulation as a teaching strategy (Jeffries, 2005, 2007) guided the study we are reporting. Student engagement incorporates the components of time and effort students put into learning. In addition, it requires faculty to create learning environments that encourage students’ active participation in their educational opportunities. Chickering and Gamson’s (1987) principles of good practice mesh well with nursing education. Nursing educators seek active-learning strategies to engage students. The more students engage in active learning, the more they learn.

The NLN/Laerdal framework developed through extensive work in the theoretical literature and empirical study provided the underpinnings for the use of simulation in nursing education. The simulation model described in the NLN/Laerdal framework consists of overlapping relationships among the teacher, the student, and educational practices. Educational practices are incorporated into the high-fidelity simulation teaching strategy (intervention) and simulation design, which influences student outcomes (see Figure 1).

Simulation design characteristics include objectives, fidelity, complexity, cues, and debriefing. Clearly written objectives for the simulation experience help guide students’ learning. The objectives need to match the students’ knowledge and experience level. Fidelity, or ability of the clinical simulation to mimic reality or a close approximation, promotes better learning outcomes. For example, a programmed high-fidelity simulation manikin can mimic human physiological responses such as elevated heart rate and blood pressure in response to a heart attack. The complexity of the simulation depends on the level of the student. Students early in the nursing program begin with simple simulation scenarios.
and progress to complex ones as their educational learning and experience advance. *Cues*, or providing information about the student’s next step or a suggestion of an appropriate clinical judgment in the simulation scenario, help progression through the activity. Students need a hint to keep them from becoming “stranded” during the scenario. Debriefing occurs at the end of the simulation scenario and encourages reflection on the learning activity. During debriefing, the instructor helps students think through the scenario critically and link theory to practice. Positive aspects of the simulation and relevant teaching points are discussed (Jeffries, 2005).

The final element of the NLN/Laerdal framework is student outcomes, which include knowledge, skill performance, learner satisfaction, critical thinking, and self-confidence. Jeffries and Rizzolo (2006) have suggested that the aim of high-fidelity simulation research in nursing education is to show that didactic knowledge gained from simulation is retained longer than knowledge gained from other teaching strategies. Student’s skill performance is an essential component of providing patient care. The use of high-fidelity simulation offers students an opportunity to develop psychomotor skills without the risk of harming patients. The simulation laboratory setting allows students to become comfortable with life-like patient situations and technology through repeated exposure and skill practice (Jeffries, 2005). Current research on high-fidelity simulation as a teaching strategy in nursing education reveals student outcomes of learner satisfaction (Childs & Sepples, 2006; Jeffries & Rizzolo, 2006; Ravert, 2004), improved critical thinking (Ravert, 2004), and increased self-confidence (Jeffries & Rizzolo, 2006; Reilly & Spratt, 2007).

**Purpose of the Study**

The purpose of this study was to compare the effects of three active-learning teaching strategies on the outcomes of performance of intervention activities, performance retention of intervention activities, student self-confidence, and educational practice preferences. We formulated the following research questions:

1. What is the difference in performance of nursing intervention activities among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?
2. What is the difference in retention of performing nursing intervention activities among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?
3. What is the difference in student satisfaction and self-confidence among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?
4. What is the difference in educational practice preferences among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?

**Method**

An experimental posttest-only design was used to evaluate the effects of three active-learning methodologies (case-based learning, simulation, and simulation with narrative pedagogy). To ensure incorporation of simulation design
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data and immediate nursing interventions. Students read the case, then interacted with members of their small group to apply theory to the case, followed by teacher- (researcher-) guided reflective thinking session questions, which were standard for all teaching strategies (see Table 1).

The simulation in this study was defined as the use of a high-fidelity manikin to mimic a patient with cardiovascular disease (myocardial infarction), on which students demonstrated assessments and implementation of immediate nursing intervention activities, followed by a teacher- (researcher-) guided reflective thinking session. The simulation with narrative pedagogy in the study was defined as the use of a high-fidelity manikin to mimic a patient with cardiovascular disease (myocardial infarction) in which students demonstrated assessments and implementation of immediate nursing intervention activities with the use of mutual dialogue among students and teacher. Mutual dialogue included the researcher’s probing students to think about priority assessments and independent nursing interventions to perform. Then the researcher followed up with a guided reflective thinking session.

Then all students completed the questionnaires and participated in the digitally recorded individual performance demonstration. During the first performance demonstration (testing, Week 3), all students implemented nursing intervention activities by interacting with a high-fidelity manikin in response to a new cardiac (myocardial infarction) scenario.

Students were given 15 minutes to prepare for the scenario and 30 minutes to provide care to the simulated patient. On completing the first performance demonstration, students independently wrote a self-reflection paper outside the classroom. The paper was to include strengths, areas to improve, and perceived and actual errors.

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**Table 1** Overview of Methods and Data Collection Procedures

<table>
<thead>
<tr>
<th>Week 1</th>
<th>Week 3</th>
<th>Week 8</th>
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</thead>
<tbody>
<tr>
<td><strong>Implementation of three teaching strategies (after cardiac lecture and cardiac study guide completed)</strong></td>
<td>First performance demonstration for all students</td>
<td>Retention performance demonstration for all students</td>
</tr>
<tr>
<td>10 minutes: Knowledge test and sign confidentiality statement</td>
<td>15 minutes: Review cardiac case scenario</td>
<td>15 minutes: Review cardiac case scenario</td>
</tr>
<tr>
<td>10 minutes: Review cardiac case scenario</td>
<td>30 minutes: Participate in an individual performance demonstration with the researcher and a high-fidelity simulation manikin (digitally recorded)</td>
<td>30 minutes: Participate in an individual retention performance demonstration with the researcher and a high-fidelity simulation manikin (digitally recorded)</td>
</tr>
<tr>
<td>30 minutes: Participate in one of three randomly assigned small group teaching strategy sessions (3–4 students per group)</td>
<td>Submit self-reflection paper</td>
<td>10 minutes: Individual debriefing session regarding student’s performance of nursing care</td>
</tr>
<tr>
<td>30 minutes: Participate in reflection session as a small group of the 3–4 students</td>
<td></td>
<td>Complete a short questionnaire (5 minutes)</td>
</tr>
<tr>
<td>Complete 3 questionnaires (after the teaching strategy; 10 minutes)</td>
<td>Total time: 45 minutes</td>
<td>Total time: 1 hour</td>
</tr>
<tr>
<td><strong>Total time:</strong> 1½ hours</td>
<td><strong>Total time:</strong> 45 minutes</td>
<td><strong>Total time:</strong> 1 hour</td>
</tr>
</tbody>
</table>

Note. Copies of the tools are available from the authors.
In Week 8 of the study, to test retention, all students participated in a second digitally recorded individual performance demonstration with the same format but with a different cardiac (myocardial infarction) case scenario. At the end, students were debriefed by the faculty member operating the computer and received detailed verbal feedback on their performance demonstration. Students received information, based on the Performance Demonstration Rubric, described later, on aspects of nursing care they performed well and areas needing improvement. After the debriefing session, students participating in the study completed a short questionnaire on recent cardiac care experiences (See Table 1). The two performance demonstration scenarios were similar to enable us to minimize extraneous variables in assessing student performance.

The measurement instruments included a 10-item test of knowledge of cardiovascular disease, which was given to students prior to the teaching interventions to assess similarity across groups. Cardiac nurse experts on the simulation research team created the test for the purposes of this study.

A demographic questionnaire of seven items was used to collect information on selected demographic information, prior health care work experience, and length of employment. The simulation research team created the questionnaire for the purposes of this study.

The Educational Practices Questionnaire was a 16-item instrument designed to measure best practices described in the work of Chickering and Gamson (1987). Using a 5-point Likert-type scale, students indicated the presence and importance of educational practices such as active learning, collaboration, diverse ways of learning, and high expectations that were present in learning activities (case-based learning, simulation, and simulation with narrative pedagogy). For this instrument, Cronbach’s alpha from the NLN/Laerdal study was .86 for presence of specific practices and .91 for importance of specific practices (National League for Nursing, 2007).

The Student Satisfaction and Self-Confidence in Learning instrument was a 13-item instrument that used a 5-point Likert-type scale to measure student satisfaction with the learning activity and self-confidence in learning. For this instrument, Cronbach’s alpha from the NLN/Laerdal study was .94 for satisfaction and .87 for self-confidence (National League for Nursing, 2007).

The Student Performance Demonstration Rubric was constructed for the purposes of this study by the simulation research team to measure students’ individual performances of nursing intervention activities with the high-fidelity simulation manikin, which were digitally recorded. The content of the rubric was based on the American Heart Association myocardial infarction guidelines. The final version of the rubric consisted of a checklist of 120 essential care items for a patient scenario on cardiovascular disease (myocardial infarction). The checklist used a 0-or-1 scale in which 0 indicated lack of accurate performance and 1 indicated accurate performance of essential care. Selected examples of essential care items are heart rate assessed within 5 minutes, three-lead EKG connected within 5 minutes, pain location assessed, and head of bed elevated.

The rubric’s 120 essential care items were summed to provide a total performance score. Students’ performances were video recorded, viewed, and scored by one researcher, and every fifth recording was also scored by a second researcher. The two evaluators’ rubric scores were then compared to establish rater agreement. Rubric rater agreement scores for these two researchers remained at 0.90 and above for spring and summer pilot studies. The scores arrived at through this approach were used in the analysis for the performance and retention demonstration measures for the students.

The Follow-up Information Questionnaire was a five-item instrument used to collect information about the students’ experience caring for patients with cardiovascular disease since completing the teaching strategy session. The simulation research team created the questionnaire for the purposes of this study.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 17.0. The power analysis showed the need for a sample size of 150 students with an approximate power of 0.75 for a moderate effect size. Demographic Questionnaires and Follow-up Information Questionnaires were analyzed with descriptive statistics: frequency counts, means, and standard deviations. In all, 151 undergraduate nursing students were eligible for the study, and 144 students consented to participate. Of the 144, 12 were men and 132 were women. Eight of the participants were Asian, one was Hispanic, one was Black, one was African, and the remaining 133 were White. Chi-square analysis on the demographic and follow-up questionnaire variables of employment, cardiovascular clinical experience, gender, ethnic background, age, marital status, and level of education showed the three groups were statistically similar. No analyses were conducted on the self-reflection papers. The one-way ANOVA analyzing the cardiac knowledge pretest scores revealed no significant differences across groups $F(2, 144) = .132, p = .877$.

Results

Research Questions 1 and 2

Research Question 1 asked, What is the difference in performing intervention activities among students who participate in case-based learning, simulation, and simulation with narrative pedagogy? Research Question 2 asked, What is the difference in the retention of performing...
intervention activities among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?

The Student Performance Demonstration Rubric measured students’ performance of intervention activities at Time 1 (first performance) and Time 2 (retention performance). Two researchers had a .90 and .94 rater agreement for the first performance and retention performance scores, respectively. A two-way mixed analysis of variance (ANOVA) was conducted on Student Performance Demonstration Rubric scores. As a follow-up if and when these analyses were significant, one-way ANOVAs were completed for First Performance Demonstration Rubric scores and for Retention Performance Demonstration Rubric scores to gain a clearer understanding of the impact of the teaching strategy on students’ first performance (Time 1) and retention performance (Time 2) scores. One-way ANOVA for first performance scores revealed, \( F(2, 143) = 2.53, p = .08 \) and retention performance scores, \( F(2, 140) = .746, p = .48 \). Students’ first performance scores indicated a trend in the positive direction of means \( (p = .084) \) for students participating in the simulation with narrative pedagogy group. The pattern of means showed the simulation with narrative pedagogy group had a higher mean, at 71.48, compared with the case-based learning and simulation groups, with lower means of 67.43 and 67.66, respectively (see Table 3). The one-way ANOVA results for the retention performance scores (at Week 8) were not significant, as evidenced by the close clustering of means. The simulation group mean was lowest, at 71.40, closely followed by the simulation with narrative pedagogy group mean, at 72.10, and the case-based learning group mean, at 73.89.

There was no significant main effect (between-subjects effect) of teaching strategy groups, \( F(2, 138) = .83, p = .44 \). Despite no differences, the pattern of students’ first performance scores indicated a trend in the positive direction of means \( (p = .084) \) for students participating in the simulation with narrative pedagogy group. The pattern of means showed the simulation with narrative pedagogy group had a higher mean, at 71.48, compared with the case-based learning and simulation groups, with lower means of 67.43 and 67.66, respectively (see Table 3). The one-way ANOVA results for the retention performance scores (at Week 8) were not significant, as evidenced by the close clustering of means. The simulation group mean was lowest, at 71.40, closely followed by the simulation with narrative pedagogy group mean, at 72.10, and the case-based learning group mean, at 73.89.

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There was a significant interaction effect (within-subjects) for time and teaching strategy groups, \( F(2, 138) = 4.08, p = .02 \). The results indicate the pattern of means for the three groups at Time 1 was different from patterns at Time 2. Because of the significant interaction effect, one-way ANOVAs were completed for First Performance Demonstration Rubric scores and for Retention Performance Demonstration Rubric scores to gain a clearer understanding of the impact of the teaching strategy on students’ first performance (Time 1) and retention performance (Time 2) scores. One-way ANOVA for first performance scores revealed, \( F(2, 143) = 2.53, p = .08 \) and retention performance scores, \( F(2, 140) = .746, p = .48 \). Students’ first performance scores indicated a trend in the positive direction of means \( (p = .084) \) for students participating in the simulation with narrative pedagogy group. The pattern of means showed the simulation with narrative pedagogy group had a higher mean, at 71.48, compared with the case-based learning and simulation groups, with lower means of 67.43 and 67.66, respectively (see Table 3). The one-way ANOVA results for the retention performance scores (at Week 8) were not significant, as evidenced by the close clustering of means. The simulation group mean was lowest, at 71.40, closely followed by the simulation with narrative pedagogy group mean, at 72.10, and the case-based learning group mean, at 73.89.

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### Table 2

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<th>F</th>
<th>Significance</th>
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<td>914.44</td>
<td>18.60</td>
<td>.00</td>
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<tr>
<td>Time &amp; teaching strategy</td>
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<td>.02</td>
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<tr>
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<td>138</td>
<td>49.16</td>
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**Tests of Between-Subjects Effects**

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<th>Source</th>
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<td>Error</td>
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### Table 3

<table>
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<th>Teaching Strategy Group</th>
<th>Time 1 (First Performance)</th>
<th>Time 2 (Retention Performance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case-based learning</td>
<td>67.43 (10.11)</td>
<td>73.89 (9.47)</td>
</tr>
<tr>
<td>Simulation</td>
<td>67.66 (10.47)</td>
<td>71.40 (10.87)</td>
</tr>
<tr>
<td>Simulation with narrative pedagogy</td>
<td>71.48 (9.27)</td>
<td>72.10 (9.50)</td>
</tr>
</tbody>
</table>
performance score means warrants attention. The simulation with narrative pedagogy group had the highest mean, at 71.48, compared with the case-based learning and simulation groups, with lower means of 67.43 and 67.66, respectively. The pattern of the simulation with narrative pedagogy group having the highest mean warrants additional research.

Research Question 3

Research Question 3 asked, What is the difference in the satisfaction and self-confidence among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?

The Satisfaction and Self-Confidence in Learning instrument contained 13 items, rated on a 5-point Likert-type scale. Students’ total scores on each of the separate constructs—satisfaction and self-confidence—were calculated. Then, separate applications of ANOVA for students’ total satisfaction scores and self-confidence scores were conducted. The test revealed no significant differences across the groups in Satisfaction total scores, $F(2, 143) = .114, p = .892$, or Self-Confidence total scores, $F(2, 143) = .131, p = .878$. Cronbach’s alphas for these two constructs were .89 for satisfaction and .82 for self-confidence. No further statistical analyses were conducted.

Research Question 4

Research Question 4 asked, What is the difference in the educational practice preferences among students who participate in case-based learning, simulation, and simulation with narrative pedagogy?

The Educational Practices Questionnaire contained 16 items, rated on a 5-point Likert-type scale. Students’ total scores on the presence of educational practices and students’ total scores on the importance of educational practices were calculated. Then, two separate applications of ANOVA were performed, one for students’ presence-of-practices scores and another for students importance-of-practices scores. The test revealed no significant differences across the groups in presence total score, $F(2, 143) = .623, p = .538$, or importance total score, $F(2, 143) = .604, p = .548$. Cronbach’s alphas for these two constructs were .84 for the presence of specific practices and .92 for the importance of specific practices. No further statistical analyses were conducted.

Discussion

High-fidelity simulation is an active-learning teaching strategy gaining popularity in nursing education to help prepare students to care for patients with complex illnesses. Limited empirical evidence exists about the effectiveness of high-fidelity simulation compared with other active-learning teaching strategies. This study is unique in that it developed a Student Performance Demonstration Rubric to measure the effectiveness of the teaching strategies.

The Student Performance Demonstration Rubric provides a new approach for assessing student performance. Numerous studies using a pre—post test design to measure knowledge gain found no significant differences between high-fidelity simulation and traditional case study groups (Griggs, 2002; Jeffries & Rizzolo, 2006; Ravert, 2004; Scherer, Bruce, & Runkawatt, 2007). The lack of significant pre—post test findings of knowledge gain relates to the fact those students’ interactions during high-fidelity simulation scenarios were focused on synthesizing and applying knowledge as they performed necessary nursing interventions; thus outcome measures should focus on the application of knowledge (Jeffries & Rizzolo, 2006).

The significant result from the two-way mixed ANOVA demonstrated that students’ Performance Demonstration Rubric scores were significantly higher at the retention performance than at first performance. Students in the three teaching strategy groups improved in their performance of nursing interventions over time. This may be because of continued laboratory interactions with the high-fidelity simulator and hospital clinical experiences throughout the semester. The impact of the performance change may be attributable to the teaching strategies because the analysis of the follow-up information questionnaire showed no significant differences in student’s clinical and work experiences caring for patients with cardiovascular disease since the completion of the teaching strategy session. When measuring retention, multiple intervening variables make it difficult to identify the impact of the research teaching strategy on the outcome of student performance. Additional research is needed on retention of learning from high-fidelity simulation.

Another significant result is the within-subjects (for time and teaching strategy groups), which showed a different pattern in the means for the three groups at Time 1 compared with patterns at Time 2. One-way ANOVA analysis for students’ First Performance Rubric scores revealed a trend in the positive direction of means ($p = .084$) for students participating in the simulation with narrative pedagogy group. Students in this group had a higher mean compared with the means of the other groups. The researchers attributed the higher first performance mean to the teaching strategy. During the simulation with narrative pedagogy teaching strategy, the researcher interacted with students by calling a few “time-out” periods. The time-outs helped students think about their performance and decision making based on essential care elements for a patient experiencing a myocardial infarction. The researcher asked, “Tell me about your thinking related to the priority nursing caring for this patient?” The researcher guided students to think about the best choice of nursing care and more appropriate assessments and interventions. If students were on the wrong track, a clue was given. The immediate feedback...
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provided an opportunity to repeat priority nursing care. Within the simulation with narrative pedagogy teaching strategy, the researcher reinforced priority assessments and interventions relevant to the scenario twice. Thus, this critical repetition may have affected the students’ performance, which may be attributable to the engaging student interaction. Additional research on the simulation with narrative pedagogy teaching strategy is needed for students early in the nursing program. The one-way ANOVA results for the retention performance scores were not significantly different. All student groups increased their retention performance rubric score means.

There was no significant main effect (between-subjects effect) of the three teaching strategy groups. Despite no significant differences in the three groups, the researchers were encouraged by the positive trend of students’ First Performance Rubric score means ($p = .084$) in the simulation with narrative pedagogy group. The higher performance score mean in this group may be due to the teaching strategy in which the instructor provided guidance to help the students think about priority nursing cares, gave immediate feedback on their performance, and allowed an opportunity to repeat priority interventions.

The similarity of the case-based learning and simulation groups’ performance may be due to students’ detailed note taking during the 30-minute reflection session that followed each of the teaching strategy sessions. The researcher encouraged students to take notes on important aspects of care. The similarity of the teaching strategy scenario to the two performance demonstration scenarios may have also contributed to lack of significant differences among the groups.

Another explanation for the lack of variability across groups was that students were talking to each other throughout the performance demonstration testing weeks. Students were told the scenario would be based on a patient experiencing a cardiac event, but not the specific cardiac problem. The performance demonstration scenario included a patient statement that “I’m feeling terrible.” Some students’ entered the patient room stating, “I hear you are having chest pain.” The quick identification of chest pain, without asking the patient, clued the researchers to the fact that students were not maintaining confidentiality about the simulated patient.

The 30-minute teaching strategy and 30-minute debriefing session may not have been long enough to capture significant differences among the groups. Research on the length of the teaching strategy is needed.

Students’ responses to the Satisfaction and Self-Confidence in Learning instrument revealed no significant differences among the three groups. One reason for lack of significant findings may have been tied to a “new teacher” from another nursing college. One researcher taught all of the teaching strategies and debriefing sessions with equal enthusiasm and standardized scripts and procedures. Students’ satisfaction and self-confidence scores were high in all three teaching strategies. They verbally commented on liking the teacher’s outlining and summarizing of important content on the board during the debriefing session, which was different from their typical laboratory debriefing sessions.

Research results vary in regards to students’ satisfaction and self-confidence with high-fidelity simulation. In the NLN/Laerdal study, students in the high-fidelity simulation group perceived higher levels of satisfaction and self-confidence in their ability to perform care compared with the case study group (Jeffries & Rizzolo, 2006). On the topic of self-confidence, Scherer, Bruce, and Runkawatt’s (2007) research found posttest confidence scores improved in both groups, although the control group scored significantly higher on posttest confidence. In summary, the varied results of students’ satisfaction and self-confidence with high-fidelity simulation warrant continued nursing research.

Students’ total scores on the Educational Practices Questionnaire revealed no significant differences in the three teaching strategy groups. The NLN/Laerdal research examined Educational Practices and found students in the high-fidelity simulation group reported a greater sense of being involved in diverse ways of learning, a greater presence of active learning, and rated active learning as being more important than students in the case study group (Jeffries & Rizzolo, 2006). Additional research is needed on the use of high-fidelity simulation teaching strategies in nursing education.

**Strengths and Limitations**

The strengths and limitations of the study need to be identified. Several techniques were incorporated to reduce extraneous variance, minimizing threats to internal validity and strengthening the study design. Strategies used were random assignment of students to groups; one researcher to implement the teaching strategies; and standardization of the teaching strategies, scenarios, scripts, and individual performance demonstration procedures. The two sessions on rater agreement in rubric scoring yielded results of .90 and above. This study used a nonprobability convenience sample, which limits the generalizability of the study results. Despite our assigning students to groups randomly and administering the cardiac knowledge test, there may have been threats to internal validity due to the differences among participants. Another limitation is the lack of reliability and validity testing of the Demographic and Follow-Up Information questionnaires.

The inability to hold the time of day constant for the study increases extraneous variance and threatens internal validity. Students’ ability to learn how to perform nursing interventions can occur over time, especially from individual clinical or hospital work experiences, which makes it difficult to determine whether the difference among groups was due to the teaching strategy interventions or to
maturation. In addition, different people respond more effectively to various teaching strategies, and some students may have been randomly assigned to a strategy that did not build on their strengths. Another possible limitation was that since students did not think aloud, the rater could not accurately score the rubric. Some assessments and interventions were simply undetectable if students did not state what they were doing or were not captured by the video camera.

Implications for Nursing Education and Research

It is challenging to quantify the benefits of high-fidelity simulation. Yet nursing education is focusing on how to use high-fidelity simulation as a teaching strategy. Educators need to continue to define best practices. For example, how much interaction should educators have with students during the high-fidelity simulation scenario? Novice students may benefit from instructors’ guidance through brief time-out periods, but senior-level students may benefit from not having instructor interaction.

Educators are becoming increasingly aware of the importance of reflection—debriefing sessions after high-fidelity simulation. Additional research may address the following questions: What strategies work best during reflection? What types of questions help students reflect on their simulation learning experience? Does summarizing important reflection content on the board help student learning? Is the time allocated for reflection important? Should reflection be written as well as oral?

Continued research on high-fidelity simulation teaching strategies is imperative. This study was guided by a framework for design, implementation, and evaluation of simulation as a teaching strategy that was developed by the NLN/Laerdal research team (Jeffries, 2005). The framework provided a valuable, empirically supported model to guide simulation research. Thus, we strongly encourage others to examine its benefits and incorporate the model into their work.

In addition, the rubric development is unique and shows promise in evaluating students’ growth and application of knowledge. Replication of this study with diverse sample populations will help validate the use of Student Performance Demonstration Rubrics as an effective measure of simulation teaching strategies. This study focused on a myocardial scenario, created from the American Heart Association standards. New scenarios would require the development of a new a rubric based on approved health care standards. Other creative instruments are needed to measure the application of knowledge in caring for patients and the effectiveness of high-fidelity simulation.

Further research is needed to explore narrative pedagogical simulation teaching strategies compared with traditional teaching strategies. Research also needs to explore students’ retention of learning and ability to apply learning to the clinical setting. Does simulation help students retain what they have learned? Does simulation enhance students’ clinical learning? What strategies help students’ transition from the simulation laboratory to real-life clinical practice?

Conclusion

An important focus of this research was measuring students’ performance and retention of performing nursing interventions. The Student Performance Demonstration Rubric provides a promising approach to measuring the effectiveness of high-fidelity simulation teaching strategies and warrants further research. It is important that the rubric evaluated students’ performance of nursing intervention, which demonstrated their ability to think critically and apply knowledge learned. Equally vital to measuring students’ performance is that students retain what they learn. In this study, students in all groups experienced improved retention rubric scores related to performing nursing interventions. Additional research is needed to understand the role of engagement theory, in combination with simulation, in the students’ retention of learning. This study reinforces the importance of faculty creating learning environments that encourage students’ active participation in their educational opportunities.

Note

1. Narrative pedagogy has been developed by Nancy Diekelmann and used in nursing education to create shared experiences for students, teachers, and clinicians (Diekelmann, 1993, 2001). The researchers combined the strategies of narrative pedagogy and simulation to maximize the principles of student engagement theory.

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References


