IMPROVING THE NEW GRADUATE AND UNDERGRADUATE STUDENT NURSES' CRITICAL THINKING ABILITY THROUGH THE USE OF SIMULATION IN NURSING: A SYSTEMATIC REVIEW OF LITERATURE

by

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Abstract

Background: Implementing what is learned in the classroom into clinical practice is an important aspect of nursing. According to Koontz, Mallory, Burns, and Chapman (2010) the clinical environment is one of the most valuable experiences for the student nurse. Learning is an active and reflective process and simulation allows for the practice of procedures as often as needed to gain confidence and proficiency (Guise, Chambers, & Valimaki, 2012).

Method: The project was a systematic review of literature that examined quantitative research studies that utilized a pretest and posttest study design to evaluate the effectiveness of simulation regarding critical thinking skills in the undergraduate student nurse and the new graduate nurse.

Results: The systematic review of literature yielded 760 research studies. Fifteen of the 760 research studies met inclusion criteria and were included in the final statistical analysis process. Cohen's D was calculated using the pretest and posttest scores along with the standard deviation. The results of Cohen's D indicated that 4 of the 5 studies showed the experimental group had a moderate effect size over the control group.

Conclusion: The analysis of the available quantitative research studies revealed simulation training to be an effective means of improving critical thinking skills among new graduate nurses and student nurses. Each study showed improvement in knowledge level. Compared to the control group the experimental group showed the same level of improvement or an increased level of improvement of up to 4% in critical thinking skills with the use of simulation training.

Keywords: new graduate, student nurse, critical thinking, simulation, and nursing education

Improving the New Graduate and Undergraduate Student Nurses' Critical Thinking Ability Through the Use of Simulation in Nursing: A Systematic Review of Literature

Implementing what is learned in the classroom into clinical practice is an important aspect of nursing. According to Koontz, et al., (2010) the clinical environment is one of the most valuable experiences for the student nurse. Learning is an active and reflective process and simulation allows for the practice of procedures as often as needed to gain confidence and proficiency (Guise, Chambers, & Valimaki, 2012).

The first year of professional practice can be extremely stressful and new graduates are often expected to perform at the same level as more experienced nurses (Pfaff, Baxter, Jack, & Ploeg, 2014). Preparing the new graduate for nursing practice begins in their education journey and continues through their first year as a new graduate nurse. New graduate nurses generally enter new nurse orientation a few weeks after graduation (Maneval et al., 2012). It is impossible to control the types and complexity of patients the new graduate encounters throughout their orientation process. Maneval et al. (2012) proposed that the use of high-fidelity simulation training could enhance the new nurse's orientation by providing certain experiences to increase critical thinking skills.

Clinical educators, whether in academia or healthcare organizations, continue to search for an effective and efficient method of education to improve critical thinking abilities for new graduates and undergraduate nursing students. Hospital-based nurse educators must keep pace and find new ways to motivate nurses to continually learn (Bultas, Hassler, Ercole, & Rea, 2014). Simulation has recently become an area of interest to bridge the gap between theory and practice (Stirling, Smith, & Hogg, 2012).

Critical Thinking

Improving critical thinking skills has remained an objective of nursing education (Wood & Toronto, 2012). Critical thinking is a process of higher-level reasoning that uses controlled and purposeful thought and strategies to gain desired results (Sullivan, 2012). New graduate nurses and undergraduate student nurses must learn to decipher relevant from irrelevant information, further information needed, and how to act upon the information obtained (Sullivan, 2012). The National League of Nurses (NLN) expectation is that new graduate nurses are able to think critically (Robert & Petersen, 2013). Critical thinking skills are essential for nurses to provide safe and effective care to the array of complex patients in today's healthcare setting. According to Kaddoura (2010b) many new graduate nurses have difficulty thinking critically in clinical practice. At this point, very few studies have examined how orientation programs help develop the critical thinking skills of novice nurses (Kaddoura, 2010).

With limited clinical agencies and a focused problem of critical thinking skills among new graduate nurses and undergraduate student nurses, improving nursing education through other sources, such as simulation, can be beneficial (Piscotty, Grobbel, & Tzeng, 2011). Nurse educators have recently adopted high-fidelity simulation to improve critical thinking skills among nursing students and new graduate nurses. It also provides students the opportunity to work in a crisis situation that they most likely will not encounter in the clinical setting (Bruce, Scherer, Curran, Urschel, Erdley, & Ball, 2009).

High-fidelity simulation has been used to augment the student nurse's critical thinking and psychomotor learning opportunities (Richardson & Claman, 2014). The benefit of simulation as a learning tool to enhance critical thinking skills is important to understand. Through the

completion of a systematic review of literature, the benefits of simulation for new graduate nurses and undergraduate student nurses will be better understood.

Simulation

Simulation is a term used to represent an artificial representation of a real life situation to improve learning (Rushton, 2015). According to Shinnick, Woo, & Evangelista (2012) simulation is an interactive technique that provides a guided experience. Providing a realistic experience without a threat to patient safety is an advantage noted with simulation (Latha, Prakash, & Lobo, 2011). Simulation is categorized by fidelity. The three levels of simulation fidelity are low, moderate, and high.

Low-fidelity simulation uses anatomical models or part-task trainers and lacks in reality (Rushton, 2015). Low-fidelity is beneficial for task or skills training (Maguire, 2013). Although this type of simulation is less expensive, it lacks the realism needed to transfer learning from theory into real-life practice (Maguire, 2013). Integrating computer technology, moderate-fidelity simulators improve the participant's ability to identify heart, lung, and bowel sounds (Maguire, 2013). The learner is able to transfer knowledge to an actual patient more readily with moderate-fidelity than low-fidelity simulation (Maguire, 2013).

High-fidelity simulation uses highly interactive simulators, or mannequins, to create a learning experience as close to a real-life situation as possible (Sinclair & Ferguson, 2009). Mannequins are programmed with highly specialized software programs of case scenarios and are able to respond to the situation and treatments the students complete. Another type of high-fidelity simulation uses standardized patients, or actors, who play a role in a scenario. Actors can play a role of the patient, family member, or caregiver and interact with the student as care is provided. With high-fidelity simulation, the learner is able to interact with the simulator and

assess the patient as interventions are completed. The simulators respond to the interventions verbally and physically. The learner is able to assess reactions in vital signs, vocal responses, and movement (Maguire, 2013).

Dearmon et al. (2013) conducted a study that used a simulation scenario with standardized patients. The purpose of their research was to evaluate the effectiveness of a two-day simulation to prepare BSN students for their first clinical experience. The research conducted was a mixed-method quasi-experimental convenience sampling of 57 BSN students. A pretest was completed before the simulation and a posttest was given after the simulation experience. The analysis was completed using the mean and standard deviation of both the pretest and posttest scores. The results were that the posttest scores were significantly higher than the pretest scores. The test group was a small convenience sampling but the results were in favor of simulations effectiveness in teaching critical thinking skills and clinical judgment to student nurses.

Goodstone et al. (2013) completed a quasi-experimental study to compare the effectiveness of high-fidelity simulation and low-fidelity simulation in nursing student's critical thinking skills. The participants were a convenience sampling of first semester ADN students. One group completed weekly high-fidelity simulations while the other group completed weekly case studies. A pretest and posttest design was utilized. On the pretest the control group's mean score was 19.24 and the experimental group had a mean score of 19.65. The posttest mean score for the control group was 21.38 and the experimental group had a mean score of 20.65.

The results showed that both groups showed improvement in the mean scores of their posttest assessment from the pretest assessment. The results were positive for the use of high-fidelity simulation but they were also positive for the control group with low-fidelity simulation.

The use of a convenience sampling and small numbers is a limitation to the study. Also, the positive results in both groups will need more research. A question may arise about the cost of high-fidelity versus low-fidelity simulation if they are both proven to be effective means of improving knowledge.

High-fidelity simulation was shown through the above research studies to be an effective means to improve critical thinking. Even though the participants differed in their education level, the posttest scores were higher than the pretest scores in both studies. One study had participants from a BSN program while the other study's participants were first semester ADN students. Simulation was shown to be an effective means of improving critical thinking.

Focus

Bridging the gap between theory and practice in regards to critical thinking ability through the use of simulation was the focus of the systematic review of literature of quantitative studies. Quantitative data uses a larger number of subjects and precise measuring tools to validate objective statistical relationships (Xavier University Library, 2012). The project focused on the available quantitative studies.

Evaluating quantitative studies allowed for statistical analysis of measured validated tools or instruments. The use of quantitative studies provided an objective demonstration of the effectiveness of simulation in new graduate and undergraduate nursing education. A systematic review of the literature focused on the use of simulation to improve critical thinking outcomes for new graduate nurses and undergraduate student nurses.

Method

Inclusion Criteria

Inclusion criteria was comprised of peer reviewed quantitative research studies from 2009-2015 that addressed simulation-based learning regarding critical thinking skills in new graduate nurses and undergraduate student nurses. The quantitative studies must have included a pretest and posttest study design, pertain to nursing, and be in the English language.

Data Sources

The electronic databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline/PubMed, and ProQuest were searched. The primary search terms included in the review were new graduate, student nurse, simulation, nursing education, and critical thinking. The databases CINAHL, Medline/PubMed, and ProQuest were chosen for the systematic review of literature due to the abundance of peer reviewed medical and nursing journals available. This choice allowed for a more thorough exploration of the available data.

Screening

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram was utilized to organize the quantitative studies collected (Figure 1). PRISMA begins with the number of data identified through the search. This search yielded 760 total studies. The project coordinator reviewed all titles and duplicate quantitative studies were eliminated. Once available quantitative studies were obtained, they were reviewed for inclusion criteria.

Inclusion criteria for this project was that each quantitative study included the five key words, a pretest posttest study design, was in the English language, and pertained to nursing. The key words were new graduate, student nurse, simulation, nursing education, and critical thinking.

Initially the project coordinator reviewed the abstract and title of each of the 760 studies. Within the 760 studies, 623 studies were excluded due to duplication or not meeting inclusion criteria for this project. A total of 137 full-text studies were screened for inclusion criteria. Of the 137 full-text studies, 15 met criteria for inclusion and were retained for evaluation. The other 122 screened studies were excluded due to not meeting inclusion criteria. Reasons for exclusion included: subjects of study were advanced practice nurses, subjects of study were physical therapy students, qualitative study design, not a pre- and posttest study design, or not in the English language.

Data Extraction

The following data was extracted from the quantitative research studies: Author, year, purpose/aim, design method, sample/setting, variables, measurement tool, data analysis, and findings (Table 1). The author, year, pretest and posttest mean, and pretest and posttest standard deviation for the control and experimental groups was also extracted for statistical analysis (Table 2).

Results

Seven hundred and sixty titles and abstracts were ultimately reviewed (Figure 1). Of these abstracts, 137 full-text studies were evaluated for inclusion criteria. One hundred and twenty-two studies were excluded due to not meeting criteria. Fifteen studies comprised the final group of included quantitative research studies for statistical analysis.

A meta-analysis of the included quantitative studies was completed. Meta-analysis is a statistical procedure that combines data from multiple studies (Biostat, 2015). According to Biostat (2015) decisions regarding the utility of an intervention cannot be determined with one study due to the varying results of multiple studies. The use of a meta-analysis will synthesize

and analyze the findings from each piece of independent data. An evidence table that contains the pretest and posttest mean scores and the standard deviation for the control and experimental group was completed (Table 2).

The results of the pretest and posttest mean and standard deviation were used to calculate Cohen's D. Cohen's D was used to standardize the information and calculate the effect size of the mean for the pre- and posttest. Cohen's D is the difference between the means divided by the standard deviation (University of Colorado, 2000). Cohen's D provided information on the effectiveness of the experimental group using simulation based learning versus the control group without the simulation. It also allowed for the evaluation of the effect size of simulation for each study.

Findings

Six of the 15 retained quantitative research studies used an experimental study group and no control. All six of these quantitative studies showed an improvement in the posttest mean from the pretest mean scores. Mean improvement from pretest to the posttest ranged from 0.64 points to 8.6 points. Nine of the studies consisted of an experimental group performing simulation based learning and control group that did not utilize simulation. All nine of the quantitative research studies showed an improvement from pretest score means to posttest score means. Although all nine quantitative research studies showed an improvement in mean scores, six of the nine studies showed a greater improvement in the experimental group from the control group. The other three studies showed no statistical difference in improvement from the experimental group versus the control group.

Cohen's D Experimental Group

Seven of the 15 quantitative research studies had the needed information available to calculate Cohen's D for the experimental group (Table 3). Cohen's D was calculated by subtracting the mean of the pretest from the mean of the posttest and dividing by the pooled standard deviation. The results ranged from 0.15 (small effect size) to 5.13 (larger effect size). These results allow for the comparison of the effectiveness of one study to another. The larger the effect size the more effective the study.

Cohen's D Control Versus Experimental Group

Of the 15 studies, five included the information needed to calculate Cohen's D to compare the effectiveness of the experimental simulation-based learning group to the control group without simulation (Table 4). The Cohen's D scores were 0.03, 0.33, 0.38, 0.48, and 0.49. A Cohen's D of 0.03, shows no difference in effect size from the experimental group and control, while the Cohen's D of 0.33 to 0.49 shows a moderate effect size from the experimental group versus the control group. These results demonstrate that four out of five studies showed that simulation is moderately more effective than traditional educational methods.

Discussion

This systematic review of literature examined quantitative research studies with the intent to determine the effectiveness of simulation-based learning in new graduate and undergraduate student nurses on improving critical thinking skills based on pre- and posttest study design. Through the systematic review process, 15 quantitative research studies were retained for statistical analysis. Twelve of the 15 studies showed improvement in learning based on the mean of the posttest compared to the pretest.

Six of the 15 retained quantitative research studies included only an experimental group. However, all six of these studies resulted in an improvement in posttest scores from the pretest scores. The remaining nine quantitative research studies were a quasi-experimental design that compared an experimental simulation based group with the control group. Six of the nine quasi-experimental quantitative research studies resulted in a greater improvement in the experimental group compared to the control group and the remaining three studies showed the same level of improvement in the experimental and control group.

Strengths

It is important to note that each quantitative research study showed that simulation was an effective means of improving critical thinking skills. Nine of the studies compared the experimental group to the control group. The results of this comparison showed that every experimental group had a greater or equal improvement to the control group. Each quantitative study showed improvement in learning, or no change in knowledge level, but there was not an instance where simulation decreased learning regarding critical thinking skills.

Weaknesses

Several of the retained quantitative research studies consisted of a small convenience sampling. Six studies, while showing improvement in learning did not have a comparison from a control group. This provided no information on how effective simulation-based learning could be compared to other forms of education regarding critical thinking skills. Another weakness that was identified through this project was the limited number of quantitative research studies available compared to the abundance of qualitative research studies. Further research is needed to assess the effects of simulation on critical thinking skills (Lewis & Ciak, 2012).

Implications for Practice

While the results of the systematic review of literature were supportive of the use of simulation training in new graduate and student nurse critical thinking, continued quantitative research is needed. The outcomes examined in the studies included self-confidence, cardiac arrest knowledge, anxiety levels, critical thinking, clinical judgment, safety and knowledge of skills, medication administration, pediatric nursing, self-efficacy, and pregnancy. It was found that simulation increased critical thinking skills but further research is needed to evaluate the most beneficial aspects of simulation (Thomas & Mackey, 2012). Quantitative research studies will assist in gaining a full understanding to the impact of simulation-based learning over traditional means of education regarding critical thinking skills.

Project Limitations

Some limitations to this systematic review of literature were present. This review was conducted by only one project coordinator, which can lead to the introduction of bias during the selection process, methodology, and analysis of the findings. It is best to have more than one project coordinator to conduct a systematic review to decrease these risks (Holopainen, Hakulinen-Viitanen, & Tossavainen, 2007). Several of the studies used a small convenience sampling, which can create unreliable results as an individual study.

The limited number of quantitative research studies available for analysis is a noted limitation in the project as well. An abundant amount of quantitative research studies would better prove the effectiveness of simulation training to improve critical thinking skills among new graduate nurses and student nurses. The lack of available quantitative research studies leads to the conclusion that more quantitative research is warranted in the area of developing critical

thinking skills through the use of simulation education among new graduate nurses and the student nurse.

Conclusion

Critical thinking is an important skill to master as a nurse. Although there is a great amount of stress for the new graduate nurse, they are expected to be able to think critically. With an increase in competition for clinical sites, inventive ways to teach critical thinking is continually needed (Weideman & Culleiton, 2014). Improvement in educating new graduates and undergraduate student nurses on applying critical thinking skills is imperative. Simulation is an area that has recently been studied for effectiveness in improving this process (Shin & Kim, 2014). Assumptions are made that learning through simulation will ultimately improve the skill set for nurses and the student nurse (Harris, Pittiglio, Newton, & Moore, 2014). This assumption was evaluated through this systematic review.

Through the systematic review of literature, simulation was evaluated through the use of quantitative studies with a pretest and posttest design. There is a great deal of qualitative studies and the use of simulation in nursing educational programs available. Unfortunately, there were only a small number of quantitative studies related to the effectiveness of simulation on improving critical thinking skills among new graduate nurses and undergraduate student nurses.

The systematic review of literature and analysis of the available quantitative research studies revealed simulation training to be an effective means of improving critical thinking skills among new graduate nurses and student nurses. Each study showed improvement in knowledge level. Several of the studies used a control group. Compared to the control group the experimental group showed the same level of improvement or an increased level of improvement in critical thinking skills with the use of simulation training.

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Table 1

Systematic Review Evidence Table

Author/ Year	Purpose/ Aim	Design/ Method	Sample/ Setting	Major Variables Studied and Their Definitions	Measurement	Data Analysis	Findings
Bruce, S., Scherer, Y., Curran, C., Urschel, D., Erdley, S., & Ball, L. (2009).	This study used simulation and a pre and post simulation test to determine effectiveness of simulation with teaching cardiac arrest in undergraduate and graduate nursing students	A cardiac arrest simulation was used with pre and post test along with quantitative data from students	107 students participated. The setting was sim-man laboratory.	IVI= simulation of cardiac arrest with high-fidelity mannequin DVI= pre and posttest along with qualitative data on student experience	The pre and post test of the students was used and analyze for student knowledge improvements pre and post scenario. A questionnaire was used to gather qualitative data from the students.	The undergraduate students were evaluated through the use of a pre and post test and questionnaire.	Overall satisfaction with the scenario was shown. Pre and post test scores either stayed the same or improved in all but 2 areas. There was a significant difference in scores for the pre and post tests 1 and 2.
Bultas, M.W., Hassler, M., Ercole, P. M., & Rea, G. (2014).	The purpose of this study was to determine if high-fidelity simulation would improve the pediatric staff nurses ability to	A pretest posttest design with high-fidelity simulation and a control group of traditional means of education	33 volunteer nurses from a non-critical care setting in a large metropolitan pediatric magnet hospital	IVI= simulation DVI= pretest/post test knowledge	Pretest and posttest scores of study and control group	The pretest and posttest mean for both groups were analyzed.	The experimental group had an increase in follow-up scores on three of the four posttests. A decline was noted on the PEARS Written

	recognize deterioratin g status compared to the traditional static mannequin teaching methods		with a clinical simulation center. 19 were in the experimen tal group and 14 in the control group				exam but this same decline was noted in the experiment al group as well.
Dearmon , V., Graves, R. J., Hayden, S., Mulekar, M. S., Lawrence , S. M., Jones, L., . . . Farmer, J. E. (2013).	This study used standardize d patients in the simulation to assist in preparing BSN students for their first clinical experience s. These experience s encompass ed concrete and abstract situations through the use of simulation	A mixed-method, quasi-experiment al study was conducted to evaluate the effect of a simulation-based orientation for a nursing foundation clinical course on knowledge acquisition , anxiety, self-confidence , and student satisfaction in BSN students preparing to begin their first clinical experience.	57 BSN students	IVI = simulation with concrete and abstract experiences DVI= pre and post knowledge assessment of each student	pre and post knowledge assessment.	Scores were analyzed using the mean and standard deviation	Posttest scores were significantl y higher than pretest scores

Goodstone, L., Goodstone, M. S., Cino, K., Glaser, C. A., Kupferman, K., & Dember-Neal, T. (2013).	The purpose of this study was to explore the development of critical thinking for students who received instruction using high-fidelity patient simulation (HFPS) versus low-fidelity simulation	A convenience sample of first-semester associate degree nursing students participated in this quasi-experimental study. One group of students received weekly HFPS patient simulations and the other group received weekly case studies. Both groups took a pre- and posttest using the Health Studies Reasoning Test.	42 first semester ADN students	IVI= high fidelity simulation and low fidelity simulation DVI= pre and posttest assessment for students in both groups	pre and posttest assessment	Posttest mean was higher than pretest mean in both groups.	Both groups showed an increase in critical thinking skills; however, there was no statistically significant difference between the HFPS and case study groups.

Harris, M. A., Pittiglio, L., Newton, S. E., & Moore, G. (2014).	The purpose of this study is to exam simulation methods to improve nursing students' medication calculation and administration abilities	Purposive sampling method of two cohorts of students.	79 students in the control sampling and 79 in the intervention sampling using simulation	IVI = Simulation versus didactic review DVI = Pre and post test assessment for both groups	pre and post test assessment	The intervention group scored significantly higher than the control group	Simulation facilitated student success
Latha, T., Prakash, R., & Lobo, D. J. (2011).	The purpose of this study is to asses effectiveness of using lecture versus computer simulation program to teach undergraduate nursing students on cranial nerve assessment	A pretest post test quasi experimental design of two groups of undergraduate nursing students	34 students completed the lecture based learning and 30 students completed the computer based simulation learning for a total of 64 nursing students	IVI = simulation versus computer based learning exercises DVI= pre and post test assessment	pre and post test assessment	The posttest scores were significantly higher in the group using the simulation compared to those that completed the lecture	Both groups showed improvement in the students knowledge.
Lewis & Ciak. (2012).	The purpose of this study was to investigate the effectiveness of simulation for learning	Quasi-experimental pre- and posttest design.	Convenience sampling of 63 student nurses	IVI = Simulation DVI = pre and posttest assessment	pre and post test assessment	a significant gain in knowledge was found between the pre and post test scores	Simulation was shown to be an effective learning tool

Maneval, R., Fowler, K. A., Kays, J. A., Boyd, T. M., Shuey, J., Harne-Briner, S., & Mastrine, C. (2012).	The purpose of this study was to determine whether the addition of high-fidelity patient simulation to new nurse orientation enhanced critical thinking and decision-making skills.	Pretest-Posttest study design to exam critical thinking in two groups of graduate nurses.	Convenience sampling of 26 new graduate nurses	IVI= simulation versus traditional orientation DVI= pretest posttest assessment	Pretest and posttest scores of study and control group	posttest scores increased in both the control and study group	Due to the increase in scores in both groups the results suggest that high-fidelity simulation did not significantly improve critical thinking ability of the new graduates
Piscotty, R., Grobbel, C., & Guey-Ming, T. (2011).	The purpose of this study is to determine whether an innovative teaching approach, simulation, was effective in increasing student quality and safety knowledge, skills, and attitudes in 6 nursing competency areas.	Quasi experimental Pretest and post test design for a series of simulations	141 students enrolled in a baccalaureate nursing program.	IVI = Simulation experience DVI - pre and post test assessment	pre and post test assessment	Mean scores increased in all competency areas	The hypothesis was supported, simulation was shown to be effective in improving students' overall knowledge, skills, and attitudes.

Shin, H., & Kim, M. J. (2014).	This study examined the effect of integrated pediatric nursing simulation courseware on students' critical thinking and clinical judgment	This study used a one-group, pretest and posttest design to evaluate the effectiveness of an integrated pediatric nursing simulation courseware in a pediatric practicum.	Ninety-five senior nursing students participated in this study.	IVI= High-fidelity simulation DVI= pre and post test assessment for participants	pre and post test assessment	pretest and post test scores were analyzed using mean scores	The critical thinking score significantly increased by 6.27 points (t = 4.032, p 0.001).
Shinnick, M. A., Woo, M. & Evangelista, L. S. (2012).	The aim for this study was to determine predictors of higher scores on the Heart Failure Knowledge Questionnaire during a high-fidelity simulation experience.	pre and post test design with a convenience sampling of undergraduate nursing students	Convenience sampling of 162 nursing students	IVI = High fidelity simulation DVI = pre and post test assessment	pre and post test assessment	posttest scores for the experimental group were higher while the control group (who did not receive simulation) were shown to be twice as likely to score within the poor knowledge group.	Simulation was shown to be an effective means of improving scores on the Heart Failure Knowledge Questionnaire.
Sinclair, B., & Ferguson, K. (2009).	The conceptual framework for this study was based on Bandura's (1977,	A mixed method design with convenience sampling	250 students enrolled in the second year of a collaborative baccalaure	IVI= simulation experience to replace lecture time vs. lecture time for the second	pre and post lecture/simulation assessment	analyzed using paired t-tests of pre/post ratings. The reflective review was	Paired t-tests of the mean differences in pre and post self-efficacy questionnai

	1986) theory of self-efficacy.		ate nursing program was used.	group DVI= pre/post assessment		analyzed for themes. Responses to open-ended questions in the satisfaction questionnaire were reviewed by the researchers and common responses were identified.	res were completed for both groups. According to the results, all but one simulation resulted in significant differences between the pre- and post-test scores for the interventio n group.
Thomas, C. & Mackey, E. (2012).	The aim of this study is to determine whether a high-fidelity simulation course significantly changes student's level of confidence, compared with a traditional clinical experience.	Quasi-experimental pre- and posttest design.	24 total students. 14 in the experimental group and 10 in the control group	IVI = simulation versus traditional clinical group DVI = pre and post test assessment	pre and post test assessment	Confidence was lower in the experimental grouping regards to the pretest scores but posttest showed a significantly higher rate of confidence in the intervention group compared to the control group	The interventio n group had a higher level of change in scores compared to the control group which shows simulation to be an effective means of improving confidence levels in undergradu ate students.

Weideman, Y. L., & Culleiton, A. L. (2014).	This study exams the effectiveness of using a virtual pregnancy model in teaching obstetrics to nursing students. The pre- and posttest show the quantitative data for the learning experience.	A virtual pregnancy with video was used. A pre and post test was completed in the study.	The sample was 91 students of the 93 enrolled in the course	IVI= Virtual simulation of pregnant patient DVI= Students scores on pre and post test	The pre- and post test scores were graded and analyzed for knowledge level of the students regarding obstetrics	Pretest scores ranged from 30-140 and posttest scores ranged from 150-200 on a 200 point scale. This is an increase of 92.53 points. .	Based on the scored, a significant difference is apparent in the pretest and posttest mean.
Wood, R. Y., & Toronto, C. E. (2012).	This study assesses the influence of simulation on critical thinking dispositions in baccalaureate nursing students.	Quasi-experimental pre- and posttest design.	85 volunteer novice student nurses	IVI = High fidelity simulation DVI = pre and post test assessment	pre and post test assessment	Experimental group testing revealed that the posttest scores were higher than the pretest scores	Based on the results of the study it shows that simulation is an effective means to educate student nurses on critical thinking.

Table 2

Mean and Standard Deviation of Pre-and Posttest

Author/Year	Pretest mean Score	Pretest SD	Posttest Mean Score	Posttest SD
Bruce, S., Scherer, Y., Curran, C., Urschel, D., Erdley, S., & Ball, L. (2009).	Competency pre-score was 54.2	20.04	Competency 62.8	9.89
Bultas, M. W., Hassler, M., Ercole, P. M., Rea, G. (2014)	PEARS Written test Control: 23.38 Experimental: 22.63	na	Control: 21.50 Experimental: 21.21	p-value 0.537
Dearmon, V., Graves, R. J., Hayden, S., Mulekar, M. S., Lawrence, S. M., Jones, L., . . . Farmer, J. E. (2013).	6.34	1.26	Improvement from Pretest Mean 0.64	Improvement from posttest SD 1.34
Goodstone, L., Goodstone, M. S., Cino, K., Glaser, C. A., Kupferman, K., & Dember-Neal, T. (2013).	19.65	4.12	20.65	4.32
Harris, M. A., Pittiglio, L., Newton, S. E., & Moore, G. (2014).	na	na	Experimental: 95 Control group 90	Experimental 6.8 Control 12.9
Latha, T., Prakash, R., & Lobo, D. J. (2011).	6.9	2.44	14.23	2.417
Lewis & Ciak. (2012).	Fall: 0.664 Winter: 0.650 Summer: 0.661 Fall: 0.695	na	Fall: 0.833 Winter: 0.786 Summer: 0.827 Fall: 0.855	na
Maneval, R., Fowler, K. A., Kays, J. A., Boyd, T. M., Shuey, J., Harne-Briner, S., & Mastrine, C. (2012).	Control: 20.92 Experimental: 20.92	Con: 3.75 Exp: 3.23	Control: 21.69 Experimental: 22.08	Control: 2.25 Experimental 2.84

Piscotty, R., Grobbel, C., & Guey-Ming, T. (2011).	Traditional 70.83 Accelerated 76.28	Trad: 8.09 Accel: 9.91	Traditional 72.31 Accelerated 78.28	Trad: 9.65 Accel: 8.16
Author/Year	Pretest mean Score	Pretest SD	Posttest Mean Score	Posttest SD
Shin, H., & Kim, M. J. (2014).	94.44	15.34	100.71	8.51
Shinnick, M. A., Woo, M. & Evangelista, L. S. (2012).	Experimental: 64 Control: 64.02	Control: 13.12	Experimental 71 Control: Posttest 2 (after sim) 69.51	CG 13.34
Sinclair, B., & Ferguson, K. (2009).	Mean Change Sim 1: Control: 2.90 Experimental: 7.45 Sim 2: Control: 4.78 Experimental: 7.38 Sim 3: Control: 8.09 Experimental: 13.22 Sim 4: Control: 7.96 Experimental: 16.47 Sim 5: Control: 6.25 Experimental: 14.60		p-value Sim 1: .002 Sim 2: .218 Sim 3: .033 Sim 4: .031 Sim 5: .001	
Thomas, C. & Mackey, E. (2012).	Not Given		Not Given	
Weideman, Y. L., & Culleiton, A. L. (2014).	91.1	22.03	183.68	12.87
Wood, R. Y., & Toronto, C. E. (2012).	Control: 303.2 Experimental: 304.5	na	Control: 304.2 Experimental: 311.3	na

Table 3

Cohen's D Experimental Group

Author/Year	Pretest mean Score	Pretest SD	Posttest Mean Score	Posttest SD	Cohen's *d* – Experi-mental Pre/Post
Bruce, S., Scherer, Y., Curran, C., Urschel, D., Erdley, S., & Ball, L. (2009).	Competency pre-score was 54.2	20.04	Posttest 1: t= -2.62, p= .010 6 week posttest: t = 4.49, p = .000 Competency 62.8	9.89	0.54
Dearmon, V., Graves, R. J., Hayden, S., Mulekar, M. S., Lawrence, S. M., Jones, L., . . . Farmer, J. E. (2013).	6.34	1.26	Improvement from Pretest Mean 0.64	Improvement from posttest SD 1.34	0.49
Goodstone, L., Goodstone, M. S., Cino, K., Glaser, C. A., Kupferman, K., & Dember-Neal, T. (2013).	19.65	4.12	20.65	4.32	0.24
Maneval, R., Fowler, K. A., Kays, J. A., Boyd, T. M., Shuey, J., Harne-Briner, S., & Mastrine, C. (2012).	Control: 20.92 Experimental: 20.92	Control: 3.75 Experi-mental: 3.23	Control: 21.69 Experimental 22.08	Control: 2.25 Experimental 2.84	0.15

Author/Year	Pretest mean Score	Pretest SD	Posttest Mean Score	Posttest SD	Cohen's *d* – Experi-mental Pre/Post
Piscotty, R., Grobbel, C., & Guey-Ming, T. (2011).	Traditional 70.83 Accelerated: 76.28	Traditional: 8.09 Accelerated: 9.91	Traditional 72.31 Accelerated 78.28	Traditional: 9.65 Accelerated: 8.16	Traditional:. 18 Accelerated: .22
Shin, H., & Kim, M. J. (2014).	94.44	15.34	100.71	8.51	0.51
Weideman, Y. L., & Culleiton, A. L. (2014).	91.1	22.03	183.68	12.87	5.13

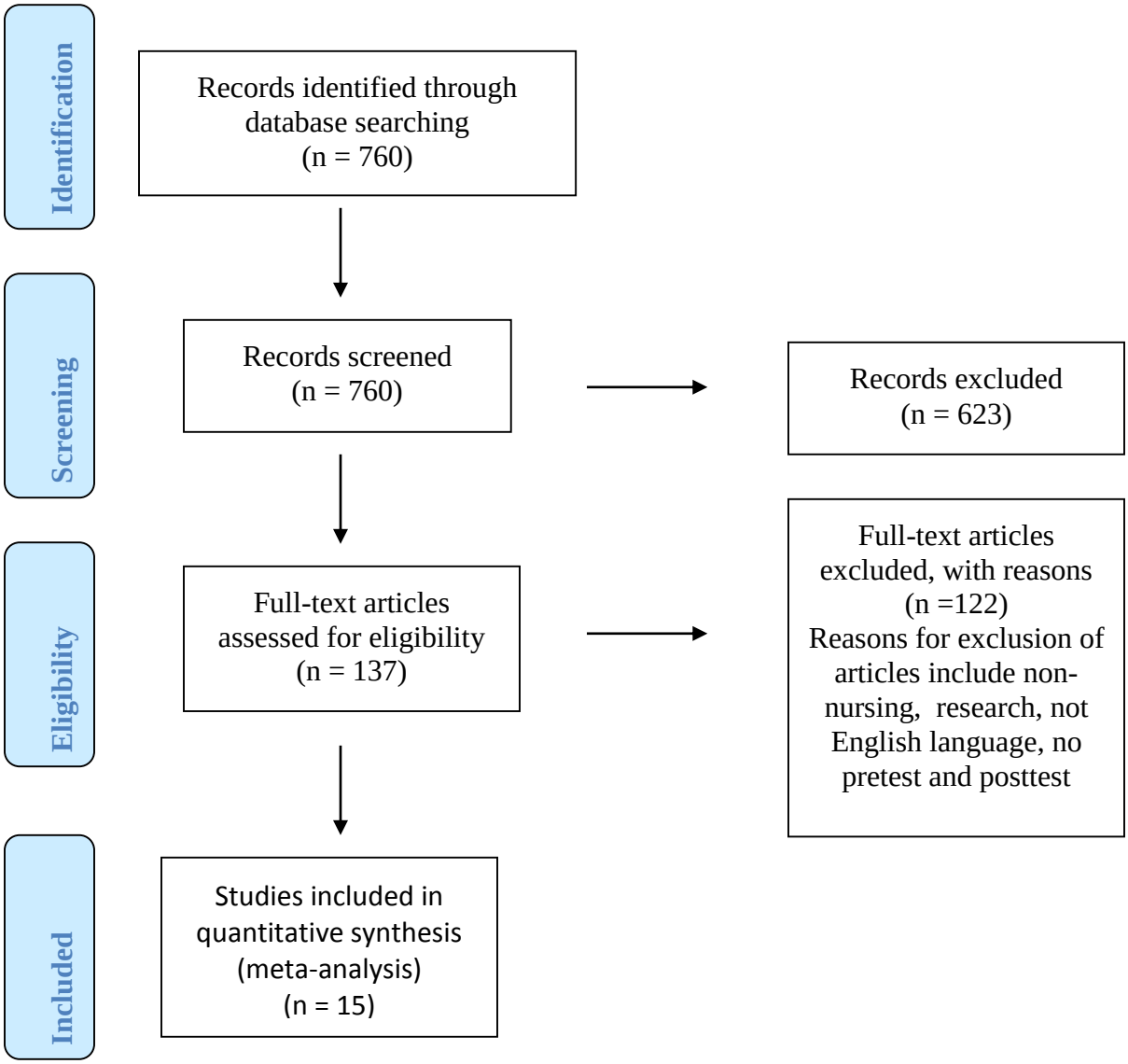
Table 4

Cohen's D Posttest Experimental Versus Control

Author/Year	Pretest mean Score	Pretest SD	Posttest Mean Score	Posttest SD	Cohen's *d* - Post Control/ Experi-mental
Goodstone, L., Goodstone, M. S., Cino, K., Glaser, C. A., Kupferman, K., & Dember-Neal, T. (2013).	Control 19.24 Experimental 19.65	Control 4.17 Experimental 4.12	Control 21.38 Experimental 20.65	Control 3.53 Experimental 4.32	0.33
Harris, M. A., Pittiglio, L., Newton, S. E., & Moore, G. (2014).	not available	not available	Control 90 Experimental 95	Control 12.9 Experimental 6.8	0.48
Latha, T., Prakash, R., & Lobo, D. J. (2011).	Control 7.76 Experimental 6.9	Control 2.764 Exerimental2 .44	Control 14.32 Experimental 14.23	Control 3.062 Experimental 2.417	0.03
Maneval, R., Fowler, K. A., Kays, J. A., Boyd, T. M., Shuey, J., Harne-Briner, S., & Mastrine, C. (2012).	Control 20.92 Experimental 20.92	Control 3.75 Experimental 3.23	Control 21.69 Experimental 22.08	Control 2.25 Experimental 2.84	0.38
Wood, R. Y., & Toronto, C. E. (2012).	Control 303.2 Experimental 304.5	not available	Control: 304.2 Experimental 311.3	Control t=3.27 Experimental t=2.26	0.49

Figure 1

PRISMA Flow Diagram



STATEMENT OF ORIGINAL WORK

Academic Honesty Policy

Capella University's Academic Honesty Policy (3.01.01) holds learners accountable for the integrity of work they submit, which includes but is not limited to discussion postings, assignments, comprehensive exams, and the dissertation or capstone project.

Established in the Policy are the expectations for original work, rationale for the policy, definition of terms that pertain to academic honesty and original work, and disciplinary consequences of academic dishonesty. Also stated in the Policy is the expectation that learners will follow APA rules for citing another person's ideas or works.

The following standards for original work and definition of *plagiarism* are discussed in the Policy:

> Learners are expected to be the sole authors of their work and to acknowledge the authorship of others' work through proper citation and reference. Use of another person's ideas, including another learner's, without proper reference or citation constitutes plagiarism and academic dishonesty and is prohibited conduct. (p. 1)
>
> Plagiarism is one example of academic dishonesty. Plagiarism is presenting someone else's ideas or work as your own. Plagiarism also includes copying verbatim or rephrasing ideas without properly acknowledging the source by author, date, and publication medium. (p. 2)

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Learners failing to abide by these policies are subject to consequences, including but not limited to dismissal or revocation of the degree.

Statement of Original Work and Signature

I have read, understood, and abided by Capella University's Academic Honesty Policy (3.01.01) and Research Misconduct Policy (3.03.06), including the Policy Statements, Rationale, and Definitions.

I attest that this dissertation or capstone project is my own work. Where I have used the ideas or words of others, I have paraphrased, summarized, or used direct quotes following the guidelines set forth in the APA *Publication Manual*.

Learner name and date	Amanda Sansom 7/26/2015
Mentor name and school	Catherine Suttle, PhD, School of Nursing and Health Sciences