



Research Article

Simulation and its Effects on Knowledge Retention and Critical Thinking Skills

Michael Ruth*

Keiser University, New Port Richey Campus in Florida, USA

*Corresponding author: Michael Ruth, Keiser University, New Port Richey Campus in Florida, USA

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Abstract

Increasing knowledge retention and critical thinking skills is the goal of every nurse educator; however, this can be difficult with traditional modes of education such as lecture and live clinical experience. With the increasing restrictions on what students can do in a clinical setting coupled with the lack of hands-on experience, has resulted in skills and knowledge deficits in nursing students. These limitations call for a new educational modality to supplement these educational losses. The use of hi-fidelity simulation, using the NLN/Jefferies framework allows for the application of Malcom Knowles adult learning theory by providing real world experience in a safe format. In this mixed methods study the effects of hi-fidelity simulation on knowledge retention and critical thinking skills has been observed over a six-week period of simulations validated by the National League of Nursing simulation design scale for nursing education research and the National.

Keywords: Knowledge retention; Nursing education; Simulation

Introduction

Increasing knowledge retention and critical thinking skills in nursing students has been a continuous goal and challenge of nurse educators. Increases in both knowledge retention and critical thinking skills is a critical component of nursing education as this is closely linked to the National Council Licensure Examination (NCLEX) pass rates [1]. Additionally, healthcare facilities expect and need new graduates to have the knowledge and skills to practice as a nurse upon graduation. Both NCLEX pass rates and readiness to work show how knowledge retention and critical thinking skills are crucial for a nursing student to develop. The goals of this doctoral project were to show that repeated simulation assists with knowledge retention and increases critical thinking skills.

Background of the Problem

The problem arises that today's student does not retain knowledge or improve critical thinking skills through lecture and

clinical experience alone. Many have become accustomed to, or grown up, with technology and learn best in a safe hands on environment [2]. The use of hi-fidelity simulation can assist the student nurse with retaining knowledge and increasing critical thinking skills in a safe and secure environment.

The classical clinical experience does not always allow for the nursing student to perfect their nursing skills, improve critical thinking, or gain new knowledge that will be retained for any length of time [3]. Often times students report the nurse they are assigned to is closed off and does not have either the time or inclination to answer the student's questions [3]. The classical clinical experience also presents challenges when students state that it is difficult to integrate what is learned in lecture to clinical practice due to either restrictions placed by the clinical facility, fear of applying newly learned knowledge to a live patient, feeling time restraints that impair developing critical thinking skills, or the inability to ask question on how to relate theoretical knowledge to clinical practice [3]. Simulation allows for students to ask questions and receive an explanation allowing for knowledge gain and retention to occur as well as allowing time for the student to

critically think through the nursing process.

Critical thinking and knowledge retention should be critical objectives of nursing programs in curriculum development as these are the skills essential to be successful on the national council licensure examination for registered nurses (NCLEX) as stated by the NCBSN [4]. A strong correlation between the ability of a nursing student to utilize critical thinking skills and the ability to recall knowledge gained with the ability to pass the NCLEX examination has been shown repeatedly [1].

In the state of Florida, the pass rate for first attempt NCLEX takers in 2018 was 72.74 percent, well below the national average of 88.29 percent [5]. Successful completion of the NCLEX is a necessity for the graduate nurse to enter the workforce as a professional registered nurse. The disparity in the state pass rate compared to the national average may be a contributive cause to the nursing shortage faced within the state of Florida.

Finally, traditional lecture alone leaves a void between what is learned and how to apply the knowledge to clinical practice. The application of knowledge occurs with the use of critical thinking skills that can be difficult to obtain in a traditional classroom setting [6]. Additionally, the student, thus creating a knowledge retention gap as well, retains only about half of what is heard in lecture or read [6].

Statement of the Problem

The problem being addressed by this DNP project is: In associate degree nursing students at the Keiser New Port Richey campus how does repeated simulation with lecture compared to using only lecture affect knowledge retention and critical thinking skills over an eight-week period? Increasing critical thinking skills and knowledge retention in the nursing student in paramount in increasing NCLEX pass rates and addressing the nursing shortage.

The successful use of simulation to promote critical thinking and knowledge retention is well documented, however inconclusive and negative results of this problem are as equally documented [1]. Inconclusive and negative results may occur in response to the design of the simulation as a poorly designed simulation may cause the participants to be less engaged and cause attrition within the study [1]. This study followed the NLN/Jefferies framework to address this problem.

Purpose of the Project

The purpose of this DNP project is to evaluate the effects of hi-fidelity simulation on knowledge retention and critical thinking skills amongst senior level associate degree nursing students. In turn, increasing these skills amongst the senior level-nursing students can assist with increasing NCLEX pass rates and address the nursing shortage in the state of Florida.

This study used a mixed methods approach as qualitative data obtained from the demographic questionnaire and the National League of Nursing educational questionnaire for nursing education research were used to gain insight from the student population being sampled consisting of senior level nursing students at the Keiser New Port Richey campus.

The research question posed for this DNP project is as follows: In the associate degree nursing students at the Keiser New Port Richey campus how does simulation with lecture compared to using only lecture affect knowledge retention and critical thinking over the course of 8 weeks.

Significance of the Project

The significance of this project was that the use of hi-fidelity simulation could allow student nurses to graduate with the knowledge and critical thinking skills that can allow them to contribute to the world of nursing. Having student nurses graduate with these abilities will allow these students to provide better care to their patients and improve patient outcomes.

The success of this project does have implications on nursing education as each nursing school in the United States has a simulation area, however not all are used consistently. Through qualitative research Simes, et al. Found these simulation labs remain empty due to faculty not feeling comfortable with using simulation equipment, staff simply being too overworked to address learning simulation equipment, and a lack of education in writing simulation scenarios or access to prewritten simulation scenarios to use in hi-fidelity simulations.

If knowledge retention and critical thinking skills can be improved with simulation, both the student and the nursing program will benefit. The student will have a stronger base of knowledge while entering the workforce leading to better patient outcomes and the nursing programs will benefit from an increase in first time NCLEX pass rates.

Nature, Scope and Limitations of the Project

This project followed a mixed methods approach and was quasi-experimental has a convenience sampling technique will be used to select the population. The project focused on knowledge retention and critical thinking skills in the senior level nursing student encompassing the problem stated. This was done via a mixed methods approach has the students qualitative review of the simulations was used to measure the validity of the simulations, pretest, posttest, as well as the results of the study being compared with the student's response to the demographic questionnaire. The simulation was validated by using the National League of Nursing Simulation Design Scale for Nursing Education Research and the National League of Nursing Educational Nursing Education Questionnaire.

Scope

This doctoral project studied the effect of simulation on critical thinking skills and knowledge retention in senior level nursing students at the Keiser university New Port Richey campus. The population was selected via convenience sampling from the senior nursing student body. Those students with previous medical experience such as a licensed practical/vocational nurse, emergency medical technician, certified nursing assistant, and patient care technician were excluded from the study. All other students were included in the sample of the population.

Limitations

One of the major limitations for this project was the small sample size. The nursing cohorts at Keiser University New Port Richey tend to be between twelve (12) to twenty (20) students. After the exclusion criteria, the population size did decrease. Furthermore, the inability to randomize the sample provides a secondary level of limitation. Lastly, due to the small sample size generalization of the study results will not be applicable.

Delimitations

Simulation works well with the adult learning theory, as the adult university students are able to relate the problem presented to a real-life scenario in a safe environment. Using the NLN/Jeffries framework provides for proven simulation scenarios that have been shown to improve critical thinking skills and knowledge retention.

This project will not assess the students study time outside of simulation or how the amount of study time affects the knowledge retention or critical thinking skills. Additionally, lecture time and the amount of lecture provided will not be addressed or evaluated as to its effects on knowledge retention or critical thinking skills

Theoretical Framework

Adult Learning Theories and Simulation

When assessing a theoretical framework for a DNP project, one must consider the population being affected by the intervention, in the case of this author the population is junior and senior nursing students at Keiser University in New Port Richey, FL. With ages, ranging from 18-48 with an average age of 27 for the population the adult learning theory must be considered as pivotal to the theoretical framework. The adult learning theory proposed by Malcom Knowles was proposed has a process model and focuses on how adults are more likely to retain information while learning new skills if the learning situation can be equated to a real-life situation [7]. Additionally, the adult learning theory focuses problem-centered learning, such as in a high fidelity simulation when based around a disease process allows for this type of learning and allows the student nurse to relate lecture

content to a real-world scenario [8].

The adult learning theory plays a crucial role in both low-fidelity and high fidelity simulations. Allowing real-world experiences to occur in a controlled environment with time for self-reflection allows the student learner to retain knowledge as well as improve crucial skills related to nursing such as critical thinking and clinical reasoning.

NLN/Jeffries Framework for Simulation

The NLN/Jeffries framework is composed of five concepts: the professor as facilitator, the student, the educational practices, the design of the simulation, and the student-learning outcome [9]. Each of these components lend themselves to the ultimate goal of the simulation improved critical thinking, knowledge gain and retention, building confidence for the learner, and the satisfaction of the learner [9]. Using this framework allows for consideration of the most important stakeholder, the student learner. When the simulation is presented as a sociocultural dialogue in a realistic environment, the student learner can be led to participate in an interpersonal learning environment, which has been shown to increase knowledge retention and critical thinking skills [9]. Again, when considering the population for the proposed intervention, many of whom are part of the millennial generation, a preference has been shown for collaborative activities with an interactive component within current student populations in nursing programs [9]. By making use of the NLN/Jeffries framework for simulation one can assure that the simulation selected will allow the student learner to achieve the student learning outcomes at the base of this author's DNP project; knowledge retention and improved critical thinking skills?

Watson's Theory of Caring

When conducting a simulation as the facilitator providing time for reflection after the simulation allows for the student to not only reflect on the knowledge gained, their actions within the simulation, but also the level of caring during the simulation [10]. This is shown in Jean Watson's theory of caring, allowing for systematically problem-solving methods of decision-making. Providing simulation for students not only allows for a safe place to increase skills needed to be a safe and effective nurse the reflective period after the simulation allows for students to assess their level of caring during the simulation, but this also is vital as caring is an integral part of nursing [10]. Watson realized the reflective period of simulation was vital in the nurse's development and plays a large role in the knowledge gained during the simulation has the caring factor allows for some measurement of the student's investment in the simulation [10].

When conducting simulation with the goals being to increase knowledge retention and critical thinking skills one must look to

educational theories as well as nursing theories to achieve the goal of the intervention. The adult learning theory focuses on providing environments in which the student learner can practice real life situations in which they can adapt the knowledge gained in a traditional format. Combining this theory with the NLN/Jeffries framework allows the simulation to provide for this adaptation while promoting the interpersonal collaboration of the student learners. Both of these theoretical frameworks lend themselves to incorporation with Watson's theory of caring allowing for systematically problem-solving methods of decision making the student learner to assess their knowledge retention of their level of holistic care. These three theoretical frameworks are the basis for assessing how simulation affects knowledge retention and critical thinking skills within a student population.

Definition of Terms

Hi-fidelity simulation: use of realistic mannequin, which produces breath sounds, speaks, and other bodily sounds via a computer program controlled by the researcher

- Hyperkalemia: elevation of a potassium level
- Chronic renal failure: kidneys do not function
- Hypervolemia- fluid overload: patient retains fluid
- Increased intracranial pressure: per the Monroe Doctrine there is a finite amount of space in the cranial cavity, when fluid shifts occur this causes the pressure in the cranial cavity to increase
- Closed head injury: occurs from blunt trauma such as a blow to the head or fall where the head hits an object
- Thromboembolic stroke: a stroke caused by a clot

Summary

With hi-fidelity simulation in conjunction with the adult learning theory presented by Malcom Knowles, the purpose of this doctoral project was to show that repeated simulation did increase the knowledge retention and critical thinking skills of senior level nursing students at the Keiser New Port Richey campus. The project did make use of the NLN/Jeffries framework to ensure the simulation is effective and did use the National League of Nursing simulation design scale for nursing education research and the National League of Nursing was the educational questionnaire for nursing education research to ensure the validity of the simulations.

Literature Review

Introduction

The purpose of this literature review is to provide evidence of the successful use of simulation to address the disparity of knowledge retention and critical thinking skills within

undergraduate nursing programs. Within the literature reviewed, knowledge retention was shown to increase as well as the critical thinking skills of the undergraduate nursing student with the use of simulation.

Review and Summary of Current Literature

While the effect of simulation on critical thinking skills is not immediate, improvement is shown over time with simulation [11]. Simulation presented on a weekly basis with continuity of concepts covered in lecture produce statistically relevant results in pre and posttests regarding simulation [11]. In a meta-analysis performed by D'Souza, Arjunan, & Venkatesaperumal [12] hi-fidelity simulation has been shown to increase safe practice, improve clinical decision-making, critical thinking skills and knowledge retention.

Simulation when presented with current and previous concepts leads to statistically significant results with knowledge retention up to three months past the initial presentation of the concepts being tested per a mixed methods study conducted by Zieber and Sedwick in 2018 [1]. Additionally, in a randomized two-arm trial short term conducted by Aqel and Ahmad in 2014 retention of material presented with simulation was shown to have statistical significance in the areas of knowledge retention and critical thinking skills.

Traditional lecture alone leaves a chasm between what is learned and how to apply the knowledge to clinical practice. The application of knowledge occurs with the use of critical thinking skills that can be difficult to obtain in a traditional classroom setting [6]. Additionally, the student, thus creating a knowledge retention gap as well, retains only about half of what is heard in lecture or read [6].

Critical thinking and knowledge retention are crucial components of every nursing program as these are the skills needed to be successful on the national council licensure examination for registered nurses (NCLEX). A strong correlation between the ability of a nursing student to utilize critical thinking skills and the ability to recall knowledge gained with the ability to pass the NCLEX examination has been shown repeatedly in numerous studies [1].

Finally, simulation when used in conjunction with traditional lecture has been shown to increase both knowledge retention and critical thinking skills within a student population [13]. The study presented by Sheakley et al. conducted a non-randomized control trial focused on short-term knowledge retention based on examination of core concepts presented within the lecture and simulation. While this study focused on short-term knowledge retention and critical thinking skills, the evaluation showed the students exposed to both simulation and lecture being one and a half times more likely to pass a summative evaluation [13].

Summary

A plethora of literature exists on how simulation effects knowledge retention and critical thinking skills within the nursing population. The common theme in the literature is that when done correctly simulation allows the student to reflect on their actions during the simulation as well as ask questions in a safe secure environment. Simulation also assists in bridging the gap between traditional lecture and clinical practice in an environment that allows for risk free mistakes.

Methods

Introduction

The purpose of this DNP project was to evaluate the effects of hi-fidelity simulation on knowledge retention and critical thinking skills amongst senior level associate degree nursing students. This was done over a six-week period with repeated hi-fidelity simulations that focused on disease recognition and priority of care per evidenced based practice. A pretest and posttest were administered with questions focusing on knowledge retention and critical thinking skills. Critical thinking is a component of question writing and is often assessed during testing [14]. In fact, critical thinking is assessed with knowledge of areas through higher-level question writing on NCLEX examination written by NCSBN certified item writers [14]. As the lead researcher in this study and certified as a NCSBN item writer, the pretest and posttest were developed with the use of both knowledge retention and critical thinking focused questions surrounding the topics placed within the simulation. Fellow faculty of the lead researcher, who are also NCSBN, certified item writers, for assessing validity as well as the fellow faculty taking the pretest and posttest to assess validity reviewed the pretest and posttest. For validation of the simulation this lead researcher used the National League of Nursing Simulation Design Scale and the National League of Nursing Educational Practice Questionnaire were administered on week eight to determine if any increase in knowledge retention and critical thinking skills occurred.

Project Design

The project design was quasi experimental as qualitative data relating to student satisfaction and demographics from pre-intervention surveys will be used to correlate data obtained from the pretest and posttest, for quantitative results, designed by this author and validated as stated above. Mixed methods research allows the researcher to incorporate both quantitative and qualitative data, thus allowing for more validity in the findings from the research done [15]. Mixed methods allowed for quantitative results to be compared, such as the means from the researcher created pretest and posttest and the students view of the simulation from a proven

tool in a qualitative manner allowing for validity to be given to the experimentation [15]. This study design also allowed for a better understanding and transferability of the findings, something that is needed do to the possible small sample size of this project [15].

Sample and Setting

The population was recruited from the nursing student body at the Keiser University New Port Richey campus. Identification of the population was achieved by reviewing the class roster of the senior level nursing course at this campus. The population was sampled using a convenience sampling method. Exclusion criteria included any student with previous medical experience, such as any who holds a current practical nursing license, certified nursing assistant license, or emergency medical technician license as these individuals have had prior medical knowledge and could alter the findings and any individual who is repeating the course. Inclusion criteria consisted of being in the final course of the nursing program and do not meet any exclusion criteria. Consent was obtained from those who meet the inclusion criteria prior to collecting any data via a face-to-face explanation of the project and signed copy of the consent form. After collection of demographic data via an anonymous survey was done, the student in an envelope placed the surveys prior to being handed to the researcher. The researcher was the only individual who reviewed the demographic data after all surveys have been collected and the participants were instructed to not include any names or identifying characteristics.

Intervention

The population sample took a pretest covering heart failure, hyperkalemia, chronic renal failure, hypervolemia, increased intracranial pressure, closed head injuries, and thromboembolic strokes as a baseline for knowledge regarding disease recognition and priority of care. After the pretest was completed, the sample population underwent six weeks of simulation. The first simulation covered heart failure, hyperkalemia (high potassium), chronic renal failure, and hypervolemia will be administered weeks one, three and five. The second simulation covered increased intracranial pressure, closed head injury (blunt trauma), and thromboembolic (clot) stroke will occur on weeks two, four, and six. During week seven no interaction with the students will occur. On week eight, the students took a posttest covering heart failure, hyperkalemia, chronic renal failure, hypervolemia, increased intracranial pressure, closed head injuries, and thromboembolic strokes with a focus on priority of care as defined by evidence-based practice.

At the conclusion of the intervention, the students filled out the National League of Nursing simulation design scale and the Educational practices questionnaire for nursing education research and will provide them to the researcher in the same fashion as the demographic data.

Instrument

The first instrument used for this project was the National League of Nursing Simulation Design Scale for Nursing Education Research. This tool measured the design of the instructor led and created simulations by the student. This tool has a reliability measure of 0.86 using Cronbach's alpha for specific practices being present [16]. Additionally, a reliability of 0.91 was obtained when measuring the importance of the tool with specific practices using Cronbach's alpha [16]. The second instrument was the National League of Nursing Educational Questionnaire for nursing education research [16]. This tool measured the four educational practice areas of: active learning, collaboration, diverse ways of learning, and high expectations as rated by the student. This tool has a reliability measurement of 0.94 for satisfaction and 0.87 for self-confidence, both scores were achieved using Cronbach's alpha [16]. Lastly, a pretest and posttest will be administered that is designed by the researcher to encompass the topics covered in the simulation.

Ethical Considerations

Students may feel compelled to enlist in the study as the author of this project teaches them in the junior semester of the nursing program. Careful consideration and explanation that no points will be awarded, or special treatment obtained from participation in the study. This was included in the consent form and discussed prior to signing. Students stated a clear understanding that participation is voluntary and there will be no reward or punishment with or without participation.

Data Collection, Analyzation, and Storage

Demographic data was collected prior to initiation of the intervention and did consist of age, marital status, support system, number of children, and employment status. Participant demographic data was collected for correlation and trends related to the population effect of the intervention. A pretest was administered to assess baseline knowledge of the concepts outlined above. After the intervention was completed, a posttest was administered to assess knowledge retained and critical thinking skills gained. With the posttest, the National League of Nursing Simulation Design Scale and the National League of Nursing Educational Questionnaire for nursing education research was administered to provide validity for the simulations. All data was collected at the Keiser New Port Richey campus.

The data was analyzed via a paired T-test to compare the means of the pretest and posttest. Additionally, use of the Pearson R coefficient was done to correlate the demographic data with the data gained from the paired T-test.

The data is being stored in an encrypted vault on the author's personal Microsoft OneDrive account. This account is secured

by password entry into the initial account and then requires a secondary different password to enter the encrypted vault.

Internal and External Validity

The internal validity of this study can be compromised by the student's study time outside of the simulation. Increased study time may alter the results of the knowledge retention variable. Additionally, the rapport built between the researcher and student in the previous semester may cause the student to increase study time to want the researcher to have a successful project.

Due to the limitations of the population size for the study the results will not be transferable to another study. Additionally, the external validity is affected by the inability to randomize the sample of the population. Finally, due to the limited sample size power for the study was not achieved.

Summary

This mixed method study aims to reinforce that repeated hi-fidelity simulation did allow for knowledge retention and improved critical thinking skills with prioritization of care in associate degree registered nursing students at the New Port Richey Keiser University campus. The pretest and posttest did focus on heart failure, hyperkalemia (high potassium), chronic renal failure, and hypervolemia in weeks one, three, and seven of the intervention. In weeks two, four, and six of the intervention the topics covered were increased intracranial pressure, closed head injury (blunt trauma), and thromboembolic (clot) stroke. No student interaction occurred during week seven. On week eight the posttest was administered and the means from the pretest and posttest were compared using a T-test as well as demographic data compared using a Pearson R coefficient.

Results and Discussion Findings

Introduction

Increasing the critical thinking skills and knowledge retention of ADN students in the goal of each nurse educator and nursing program. This goal has been a challenge as graduate nurses entering the workforce are often underprepared or graduate nurses simply do not have the retained knowledge or critical thinking skills to pass the NCLEX [1]. This is complicated by the changing student demographic who have grown up with technology and face difficulties in traditional classroom settings [2]. The intent of this project was to show how simulation affects critical thinking and knowledge retention in ADN students.

Summary of Methods and Procedures

At the outset of this project, the hope was to recruit five to ten students using convenience sampling from the ADN nursing program at the New Port Richey campus of Keiser University. Due

to smaller than normal class sizes at the time of the implementation of this project, recruitment of volunteers was limited to three students out of a possible eight after exclusion criteria was met. Additionally, two of the three volunteers answered yes to working while in the ADN program. This does necessitate a change a change in the analysis of the project as the sample of the population was too small to show statistical significance, instead a comparison of the means will be conducted as well as paired T test.

Summary of Sample and Characteristics

All aspects of the project took place in the simulation lab located on the New Port Richey campus of Keiser University. Within the lab is a hi-fidelity mannequin powered by Laederal software, the professor (the DNP student) and the volunteers were located in the same room. Of the seventeen possible students targeted for this project, nine were excluded due to previous experience; leaving a population of nine students to draw from. Out of these nine students, three agreed to volunteer for the project. Those who participated had no previous experience as CNA’s, were all female, did not have any children, and two of the volunteers stated they were currently working in a non-medical field has shown in Appendix A.

Major Findings

Of the three (n=3) participants in this study a total of three completed the pretest, posttest, NLN Educational Questionnaire, and NLN Simulation Design Scale Table 1 and Table 2. The mean age of the participants was 25 years, all three participants were female, two of the three participants reported they were currently working, and all three reported no previous experience in any portion of the nursing field. Due to a small sample size of only three volunteers, this research was unable to any statistical significance. The paired T test presented a P value of 0.006, a standard deviation of 5.77, and a mean difference of 43.3 percent from the pretest to the posttest, presented in the Table 3 and Table 4 and Chart 1 in Appendix A. The mean of the pretest is shown to be 36.7 percent and the mean of the posttest was shown to be 80 percent. The difference in the means offers some proof that the intervention does work on a small scale and provides a strong basis for the need for future research with larger populations. The NLN Simulation Design Scale and Educational Questionnaire results are presented in Table 5 and Table 6 respectively in Appendix A.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	none	3	100	100	100

Table 1: Children.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not working	1	33.3	33.3	33.3
	working	2	66.7	66.7	100
	Total	3	100	100	

Table 2: Employment status.

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Posttest Scores	80.00%	3	10.00%	5.77%
	Pretest Scores	36.67%	3	15.28%	8.82%

Table 3: Paired Samples Statistics.

		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	Postest Scores - Pretest Scores	43.33%	5.77%	3.33%	28.99%	57.68%	13	2	0.003	0.006

Table 4: Paired Samples Test.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NLNEducationalPrcticesQuestionnaire	0				
Active Learning	30	3	5	4.9333	0.36515
Collaboration	6	5	5	5	0
Diverse Ways of Learning	6	2	5	4.3333	1.21106
High Expectations	6	2	5	4.3333	1.21106
Importance to Student	16	5	5	5	0
Valid N (listwise)	0				

Table 5: NLN Educational Questionnarrie.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
NLNSimulationdesignscale	0				
Objectives and Information	15	5	5	5	0
Support	12	5	5	5	0
Problem Solving	10	5	5	5	0
Feedback Guided Refelction	8	5	5	5	0
Fidelity	4	5	5	5	0
Importance to Student	49	5	5	5	0
Valid N (listwise)	0				

Table 6: NLN Simulation Design Scale.

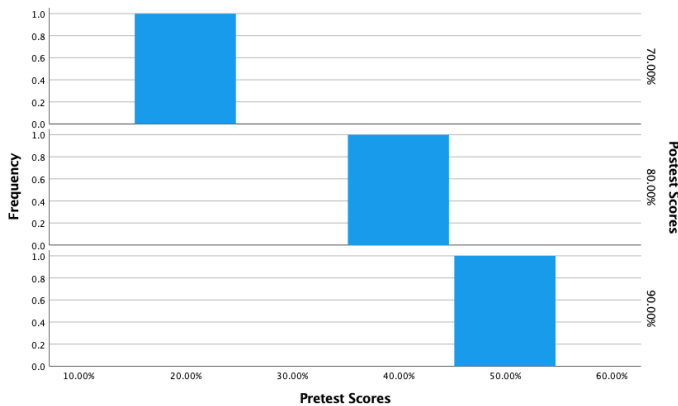


Chart 1: Frequency.

Implications for Nursing Practice

The implications of this project are very few due to the small sample size of three out of a possible total of eight after exclusion criteria had been met. With a mean difference in scores of 43.3 between the pretest and posttest, this project does show promise that simulation has a positive effect on critical thinking skills as well as knowledge retention in ADN students. To state this point in other terms, the mean of the pretest was 36.7 percent, and the mean of the posttest was 80 percent. This lends validity to the project as an improvement was shown even with the small sample size and the inability to show statistical significance.

In the literature review for this project, the author found similar interventions regarding simulation and about half showed improvement and half did not and the design of the simulation was never described as following an evidence-based model. This author set out to use the NLN/Jefferies simulation model to design the simulation and show that when an evidence-based model is used simulation has a positive effect on critical thinking and knowledge retention. While this study was unable to prove statistical significance, the difference in the means shows an improvement in the scores between the pretest and posttest showing that when a proven design method for the simulation is used simulation can have a positive impact on critical thinking skills and knowledge retention.

Recommendations

Students within an ADN program have many demands on their time from coursework, to family, work, student nurses' association, study time, and the limited amount of time for themselves. To this point, this author found recruitment for the project difficult, as many students who met the criteria to participate, simply did not wish to wedge another task into their already busy schedule. This author believes that some sort of incentive, such as clinical hours if approved by the program and allowed within state law, five-dollar

gift cards for coffee, or a similar incentive may cause the student to consider participation even given their already hectic schedule.

In addition to the incentive, a longer study is needed to truly assess the effects of simulation of critical thinking skills and knowledge retention. An eight-week project is not long enough to truly assess these affects, as a second posttest should be given at a minimum of one month after the first posttest has been given. This author would truly recommend performing this research in the future over two sixteen-week semesters to truly evaluate the effectiveness of this intervention.

Discussion

This study shows the potential for simulation to have a positive effect on critical thinking skills and knowledge retention amongst ADN students. While the small sample size provides a string limitation of this study, if viewed as a pilot study it does show merit as an increase in scores from the pretest to posttest provides a positive result. The limitation of the small sample size could be corrected in the future by gaining approval to offer clinical hours for participation within the simulations, which would require approval from the department chair however is covered by the Florida state law that allows simulation to be fifty percent of clinical time (Floridanursing.gov, 2019).

The strength of this study can be found in reviewing the mean difference between the pretest and posttest. This provides a strong base for future research and gives a glimpse of how much simulation can affect critical thinking skills and knowledge retention within an ADN student population. Additionally, the results of the pretest and posttest lend validity to the use of a proven framework for simulation to provide the most effective simulation for the student.

Lastly, one cannot expect a large sample size of a student population without some incentive for participation. It is this author's opinion that had an incentive been offered a sample size large enough to show statistical significance could have been obtained. As stated above an ADN student's time is at a premium given all the demands placed on them from their personal life to life as a nursing student. An incentive was not offered for this project, as it was this author understands that this may have complicated IRB approval and further delayed the project implementation. With a limited timeline for project completion to be in line with graduation, the incentive was placed by the wayside.

Conclusion and Contributions to Nursing

The purpose of this project was to show that simulation, when using the NLN/Jefferies framework, has a positive impact on critical thinking skills and knowledge retention amongst ADN student at the New Port Richey campus of Keiser University. While this project did not meet the criteria to show statistical significance,

a positive impact on the scores between the pretest and posttest are noted. This provides a pathway to show improvement in critical thinking skills and knowledge retention for the ADN participants [9].

While this project is faced with a large limitation of a small sample size, contributions to nursing education can still be gleaned from the results. Viewing this project as a pilot study, as many DNP projects are, groundwork is laid for future research with the use of an identified framework for simulation design such as the NLN/Jefferies framework used here [2]. While about half of the literature on simulation does not conclusively prove the effects of simulation and the other half shows effectiveness, a major component is missing from all of the research in the above literature, the type of framework used for simulation [11]. This may be the largest contribution provided, a new hypothesis can be formed: that the type of simulation design used may play a large role in the effectiveness of simulation of critical thinking and knowledge retention for ADN students. However, given the limitations further research is needed for this conclusion to be validated.

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