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Using Simulation in Nursing Didactic Classes to Enhance Students' Critical Thinking and Knowledge

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ABSTRACT

There are 3.69 % improvement in the passage rate of The National Council Licensure Examination (NCLEX) after using simulation in the nursing programs (Terwilliger, 2013). Simulations have become important in the nursing field as it enhances the critical thinking skills of students in nursing schools (Adib-Hajbaghery & Sharifi, 2017).The study's aim was to examine if using simulation in nursing didactic classes can facilitate critical thinking of nursing students. The design of the pilot study was a convenience, non-randomized trial. A total of thirty-three nursing students at the Indiana University Kokomo (IUK) campus were involved in the study. The students were from pharmacology and pathophysiology class. The independent *t*-test was used to compare the means of two independent groups to find out if there is a significant difference between the two groups (pre and post-test). The study revealed that there is no significant improving in critical thinking skills among nursing students and no increasing in their grades after exposure to the simulation experience. This study has limitations as the following small sample size and lack of control group. Further research studies on a large scale should be performed to validate the effectiveness of simulation in improving the critical thinking skills and decreasing the attrition rates.

Keywords: Nursing Didactic Classes, Students' Critical Thinking.

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1. Introduction

Nursing instructors and hospital educators need to examine different teaching methods to facilitate critical thinking. Simulation is a teaching method to increase the critical thinking skills. Simulation is a technique that is mimic to real experiences with guided instructions Simulation is a technique that is mimic to real experiences with guided instructions that imitate the basic aspects of the real world in a fully manner (Gaba, 2004). Simulations have become important in the nursing field as it improves the critical thinking of students in nursing schools (Adib-Hajbaghery & Sharifi, 2017). Although fresh to the profession, new nurses are supposed to have the essential skills to deliver quality and safe patient care within a complex healthcare environment. However, newnurses struggle because of underdeveloped critical thinking skills (Unver, Tastan, & Akbayrak, 2012). Nurses must use their knowledge and experience to reason, think, and judge, then reflect on their practice to improve patient care. New nurses, having underdeveloped critical thinking skills, cause more errors and have fewer positive patient outcomes than more experienced nurses (Benner, Hughes, & Stupen, 2008; Unver et al.,2012).Errors result in complications from increased hospital stays to significantly reduced patient and family satisfaction (Reeves, West, & Barron, 2013).

The rate of students' failure in nursing programs and licensing exams is increasing over time. Some research studies showed a high percentage of attrition rate among nursing student as 50% in some baccalaureate nursing programs (Merkley, 2015). Simulation has shown promising results when used in nursing schools as it improves student's critical thinking skills (Adib-Hajbaghery & Sharifi, 2017). "The passage rate of The National Council Licensure Examination
(NCLEX) increases by "3.69 %" when simulation is used in the pre-licensure nursing programs" (Terwilliger, 2013, p.1).

2. The Purpose of the Study, Research Questions, and Hypothesis

This study will add evidence to the following questions:1) How does using simulation in nursing didactic classes improve students' critical thinking skills and knowledge? 2) How much simulation is required to enhance the critical thinking of nursing students? 3) How does simulation increase grades and decrease attrition rates in the classroom? The study is testing the following hypothesis: critical thinking of nursing students is enhanced after using simulation in nursing didactic classes.

3. Theoretical Framework

Kolb (1984) published his learning styles model that called "Experiential Learning Theory," which focus on the significance of experience in the process of learning. Kolb's theory provides a process for knowledge related to the needs of each individual learner (Poore, Cullen, & Schaar, 2014). Kolb designed his model with four elements including "concrete experience", "reflective observation", "abstract conceptualization", and "active experimentation" (McLeod, 2010, p. 2). He has presented these elements as a circle in which these four steps follow each other. Kolb developed four learning styles including diverging**,** assimilating**,** converging, and

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accommodating (McLeod, 2010). Kolb mentions that each learner prefers a specific learning style (McLeod, 2010).

Simulation provides nursing students the opportunity to practice safely within their schools. Each simulation will bring forth a new learning situation for the student (McLeod, 2013). By applying Kolb's model on simulation, the concrete experience is becoming a new lived situation in the simulation lab. Reflective observation on the new experience (simulation) and thinking about what have been experienced and it usually happens during and after the simulation debriefing stage. Abstract conceptualization gives learners the chance to stimulate new ideas and consider if anything must be done in a different way throughout the simulation experience. During active experimentation, students examine what was learned by applying new knowledge and experience in the future such as further simulation or clinical practice (Poore et al., 2014).

3. Literature Review

3.1 Critical Thinking

Critical thinking (CT) in nursing is the process where knowledge and experience are used to consider various options for achieving the desired goals while also considering the patients' situation (Benner et al., 2008). The goal of nursing education is to heighten critical thinking of nursing students for professional development. (Adib-Hajbaghery & Sharifi, 2017). Nursing students must be self-directed and critical thinkers to be capable of making well-planned decisions and solve problems they experience in clinical settings (Adib-Hajbaghery & Sharifi, 2017; Ahn & Kim, 2015; Chiang & Chan, 2014).By using simulation, learners can be exposed to different scenarios to stimulate critical thinking, and then respond appropriately to the situation (Adib-Hajbaghery & Sharifi, 2017).

Shin, Ma, Park, Ji, & Kim (2015) studied a total of 237 students from three universities in Korea were joined in the study. All participants were registered in a pediatric nursing practicum course between February and December 2013. All the three universities (A,B,C) utilized the same simulation cases, evaluation, and tools. Nursing students who were in school A had a one simulation session, and students that in school B were exposed to two simulation sessions. On the other hand, students at school C finished three simulation sessions (Shin et al., 2015). By comparing the critical thinking gains from the post-test to the pre-test, School C had the highest gains in critical thinking as 2.45, while the gains in School B was 1.50 and in School A was 0.66 (Shin et al., 2015)

3.2 Safety

The incidence of medical errors in healthcare settings has become a concern for many patients and their families. In 2010, the Office of Inspector General for the Department of Health and Human Services mentioned that there are 180,000 patients died in Medicare alone due to the bad healthcare in a particular year (Propublica, 2013). Simulation can potentially reduce medical errors such as poor medical care,

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infection, injury, and medication administration errors. Simulation strategy gives students the chance to practice in a safe environment and equips nursing students with the capability of practicing safely in clinical settings (Adib-Hajbaghery & Sharifi, 2017; Fawaz & Hamdan-Mansour, 2016; Reid-Searl, Happell, Vieth, & Eaton, 2012).

3.3 Clinical Judgment

Nurse educators have the opportunity to help their students develop clinical judgment and potentiate safe and high-quality patient care by using simulation strategy (AL Sabei & Lasater, 2016). Weatherspoon, Phillips, and Wyatt (2015) compared the influence of simulation on the clinical judgment skills of nursing students. The sample size was 117 participants whose participation was voluntary. The results showed that electronic interactive simulation (EIS) could enhance the clinical judgment among nursing students.

3.4 Competence, Confidence, and Experience

Using simulation in nursing schools gives nursing students the chance to implement the theoretical content they have learned into clinical settings (Adib-Hajbaghery & Sharifi, 2017; Sundler, Pettersson, & Berglund, 2015; Reid-Searl et al., 2012). Nursing students preferred high fidelity simulation than the clinical placement (Au, Lo, Cheong, Wang, & Van, 2016). Over 70% of the participants expressed that they had a positive feeling toward high fidelity simulation activities. Only one student emphasized that the simulation experience was boring (Au et al., 2016). The students revealed that simulation helped them to build up their knowledge and improve their self-confidence (Sundler et al., 2015).

3.5 Problem Solving and Decision Making

Simulation experience helps nursing students in making decisions and applying critical thinking skills in daily care and critical situations (Gamble, 2017). According to Ko and Kim (2014), "Multi-mode simulation is an effective teaching and learning method to enhance the problem-solving process and clinical competence of nursing students" (p. 105). Gamble (2017) examined 28 nursing students faced critical medication errors and some medical complications in simulation labs; through this process, identification of these problems were recognized and rectified by nursing students. This helped them in improving their problem solving skills and preparing them as a future decision makers.

4. Knowledge Gap

Literature reviews revealed that simulation could promote critical thinking skills of nursing students. However, further research studies are needed for more valid evidence on the effectiveness of simulation experience on critical thinking. Therefore, the goal of this study is to examine if using simulation in nursing schools can enhance critical thinking of students. The attrition rate and critical thinking appraisal scores will be examined to measure if critical thinking was significantly improved and

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attrition rates decreased.

5. Methodology

5.1 Participants

In this study, the total of participants will be 39nursing students at the Indiana University Kokomo (IUK) campus. The students will be from B261 a pharmacology and pathophysiology class. Whether students have volunteered to be in the research or declined, they all will take the same educational simulation and classroom teachings.The study will help to quantify the number of simulations required to increase student nurses' critical thinking.

6. Materials

The Watson Glaser Critical Thinking Appraisal II (WGCTA) will be distributed to measure the participants' critical thinking pre and post simulations. The National League of Nursing Student Satisfaction and Self-Confidence in Learning Survey will be used to measure students' satisfaction and self-confidence after the simulation sessions (see Appendix A). In addition, nursing students will be given case studies about hypertension and hyperlipidemia, myocardial infarction (MI) and heart failure, diabetes, and respiratory disorders. Students will be given scenarios about the previously mentioned medical conditions, and they will demonstrate the role of doctor, nurses, and patient. The simulations with the high-fidelity mannequins will be used. Students will be given questions for study material when they are not in the simulation situation. Questions will cover the anatomy, physiology, disease process, medications, and patients teaching.

7. Design

The design of the pilot study will be convenience, non-randomized trial. The variables are critical thinking, satisfaction, and self-confidence. Levels of those variables are interval. The project will use the paired t-test. The paired t-test will measure a specific characteristic of interest. For the study, intra-rater comparison of the pre and post-Watson Glaser Critical Thinking Appraisal II will be done.

8. Procedure

The students in B261 a pharmacology and pathophysiology class will be asked voluntarily to participate in the research study. The instructor of the class will not be present when the research will be explained and when consents are being signed. The principal investigator who is not affiliated with IUK faculty but is a student in a master nursing program and has no influence on the grades. The students who volunteer to be in the study will be asked to take the Watson Glaser Critical Thinking Appraisal II which will take 20 minutes to complete. All students who volunteered in the study will be asked to withdraw a number from a hat which will put in their critical thinking test. Each student will put their number inside an envelope and write their names on it. The envelopes will be given back to the participants for the second

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taking of the WGCTA II. Then, Pre and post-tests will be compared. Four simulation sessions will be conducted during the 16-week semester. Each simulation session will take 2 hours. The students will have a 20 minutes simulation with high fidelity mannequins and 20 minutes debriefing. The four simulations are 1) cardiac hypertension and hyperlipidemia, 2) cardiac MI and heart failure, 3) diabetes, 4) respiratory. Simulation lab has four rooms, and six students will be in each room. The students will be rotated in and out of the simulation. When the students are not in the actual simulation lab, they will have case studies or critical thinking activities to promote critical thinking (low-fidelity simulation). At the end of their course, the students' grades and test scores will be compared to the previous semester to appreciate any improvement. The students will be asked to take the National League of Nursing Student Satisfaction and Self-Confidence in Learning Survey which will take five minutes to complete.

9. Ethics

The Internal Review Board (IRB) approval was obtained by the Indiana University IRB Board. The principal investigator administered and graded the critical thinking appraisal and saved the results on a password protected computer. All records are maintained in a locked desk inside a locked office for five years. The nursing faculty members don't have an access to the envelopes with the students' names or numbers. They will not grade the critical appraisal tool or see the individual results. They will only see the final results.

10. Statistical Tools

The variables that will be measured in this study are critical thinking, satisfaction, and self-confidence. The Watson-Glaser Critical Thinking Appraisal [WGCTA] (Watson & Glaser, 1980) measures the critical thinking abilities among nursing students. The tool consists of a 40-question test, evaluating the following five items: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. The reliability of the tool was recognized since 1980 (Watson & Glaser, 1994). The reliability was tested using Cronbach's alpha. Watson & Glaser used coefficient validity, concurrent validity, predictive validity, and construct validity. The analysis was used and correlation between the WGCTA scores and Psychology course grades was identified. The coefficients were computed, ranging from 0.69 to 0.85. The reliability and validity of WGCTA have been tested in various settings, and they obtained the same statistical findings (Watson & Glaser, 1994). The tool WGCTA II approval was obtained to be used in this study (see Appendix C). This study will not reveal any information about the appraisal since there is no permission for publishing the questions of the appraisal.

The National League of Nursing Student Satisfaction and Self-Confidence in Learning Survey will measure students' satisfaction and self-confidence. The tool

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consists of 13 questions: five questions ask about students' satisfaction, and eight questions ask about students' self-confidence using a five-point scale (see Appendix A). The content validity of this tool was established by ten experts in simulation development and testing. Cronbach's alpha was used to test the reliability of this tool: satisfaction = 0.94; self-confidence = 0.87 (National League for Nursing, 2017). NLN permission to use tools and instruments was obtained (see Appendix B).

These variables will be measured to identify how much simulation is required to promote the critical thinking of nursing students. In addition, the results of this research will help determine the future of simulation in the nursing program and a higher NCLEX first-time pass rates. Descriptive statistics will be used to describe the demographic information of the students. Inferential statistics and the paired t-test will be used to determine the results of the study. The t-test is utilized to analyze the means of the two groups (pre and post-test) using statistical examination. The p-value will be used to identify a statistically significant difference and the predetermined confidence interval of 0.05.

11. Analysis

11.1 Data Collection

The (WGCTA) was chosen to measure nursing students' critical thinking skills pre and post-simulation. Participants' critical thinking skills were measured by demonstrating case studies, and then answering questions when they are not in simulation situation. Nursing students were taken the WGCTA twice, once at the beginning of the course and once at the end of the semester.

11.2 Data Analysis and Statistics

The power analysis will be used to determine a sample size of 33 was needed for the reliability of the research. The Statistical Package IBM SPSS 22 program will be used to analyze the pre and post WGCTA data. An independent *t*-test analysis will be utilized on the pre and post-test scores. The independent *t*-test will compare the means of two independent groups to determine if there is a significant difference between the two groups (pre and post-test).

12. Demographics

Age and educational background of participants have been determined. Age was determined due to experience can affect critical thinking abilities. Young people typically have higher critical thinking abilities than older adults because they have higher-level cognitive functions (Glisky, 2007). Previous educational experience was established as a variable in critical thinking. The ethnicity and gender of the participants were established as they were variables.

13. Results

Simulation scenarios were created to combine the cognitive and psychomotor skills

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related to the learning objectives. The results were as the following: Pearson Correlation of Var 1 was 1., Sig. (1 tailed). - no results. Sum of Squares and cross products 1375.077. Covariance 36.186, N 33. However, Pearson Correlation of Var 2 was 0.587., Sig. (1 tailed) .000, Sum of squares and cross products 663.765, Covariance 17.468, N 33. No significant difference has been showed by the T test. Correlation significant at p=.01 on tail. Var 1 mean was 22.1538, Standard Deviation was 6.01550, N 33. Var 2 mean was 22.87.18, Standard deviation was 4.9404, N 39.

14. Conclusion and Limitations

There is no significant increase in critical thinking skills of nursing students after their exposure to the simulation experience. Furthermore, the grades of nursing students have not been increased after simulation. However, one limitation of this study was that the sample size is limited. Further research studies on a large scale should be performed to validate the effectiveness of simulation in improving the critical thinking skills and decreasing the attrition rates. Another limitation was the lack of a control group due to the small sample size. A control group may give a comparison data to enable analysis of the real influence of simulation experience on students' critical thinking.

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Appendix A

Student Satisfaction and Self-Confidence in Learning

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your simulation activity. Each item represents a statement about your attitude toward your satisfaction with learning andself-confidenceinobtainingtheinstructionyouneed.Therearenorightorwronganswers.Youwillprobablyagreewith some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:
1=STRONGLYDISAGREEwiththestatement
2 = DISAGREE with thestatement
3=UNDECIDED-youneitheragreeordisagree with the statement
4 = AGREE with thestatement
5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	**SD**	**D**	**UN**	**A**	**SA**
1. The teaching methods used in this simulation were helpful and effective.	1 ○	2 ○	3 ○	4 ○	5 ○
2.Thesimulationprovidedmewithavarietyoflearningmaterialsandactivitiesto promote my learning the medical surgicalcurriculum.	1 ○	2 ○	3 ○	4 ○	5 ○
3. I enjoyed how my instructor taught the simulation.	1 ○	2 ○	3 ○	4 ○	5 ○
4.Theteachingmaterials used inthissimulationweremotivatingandhelpedme to learn.	1 ○	2 ○	3 ○	4 ○	5 ○
5. The way my instructor(s) taught the simulation was suitable to the way I learn.	1 ○	2 ○	3 ○	4 ○	5 ○
	○	○	○	○	○

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Self-confidence in Learning	SD	D	UN	A	SA
6.IamconfidentthatIammasteringthecontentofthesimulationactivity that my instructors presented tome.	1	2	3	4	5
7.Iamconfidentthatthissimulationcoveredcriticalcontentnecessaryforthe mastery of medical surgicalcurriculum.	1	2	3	4	5
8. I am confident that I am developing the skills and obtaining the required knowledgefromthissimulationtoperformnecessarytasksinaclinicalsetting 9. My instructors used helpful resources to teach thesimulation.	1 1	2 2	3 3	4 4	5 5
10.ItismyresponsibilityasthestudenttolearnwhatIneedtoknowfromthis simulationactivity.	1	2	3	4	5
11.IknowhowtogethelpwhenIdonotunderstandtheconceptscovered in thesimulation.	1	2	3	4	5
12. I know how to use simulation activities to learn critical aspects of these skills.	1	2	3	4	5
13.Itistheinstructor'sresponsibilitytotellmewhatIneedtolearnofthesimulation activity content during classtime.	1	2	3	4	5

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Appendix B

NLN Permission to Use Tools and Instruments
Tools and Instruments
Use of NLN Surveys and Research Instruments
The NLN's copyrighted surveys and research instruments are an important part of its research activities.

Permission for use of surveys and research studies is granted free of charge. Available instruments may be downloaded and used by individual researchers for non-commercial use only with the retention of the NLN copyright statement. No need to contact the NLN for taking a permission.

In granting permission for non-commercial use, it is understood that the following caveats will be appreciated by the researcher:

1 Researcher is responsible to specify whether the NLN research instrument is appropriate to her or his particular study.
2 The researcher is responsible for any modifications are made to the tool which may affect the reliability or validity of the research results.
3 NLN instrument must be cited when the research results are published or printed. If the content of the NLN survey/instrument was modified in any way, this must be indicated in the text of all materials where the study results are published or printed.

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Appendix C

Watson-Glaser Critical Thinking Appraisal Approval

Subject: Re: Paperwork for Watson-Glaser Critical Thinking Appraisal Tool
Date: Thursday, May 15, 2014 at 12:04:58 PM Eastern Daylight Time
From: -, Research Assist (sent by diana.sandoval@pearson.com <diana.sandoval@pearson.com>)
To: Ledbetter, Tamera Louise

Tamera Ledbetter,

The "Enhancing Clinical Reasoning Through Evolving Case Studies." research study has been approved to receive a 50% discount for the following assessments: Watson-Glaser I Critical Thinking

If you require additional materials for this study, please reference the following information on your next order: The name of the study, Agreement Code "RES", 50% discount and Account # 1767992.

This discount will be valid until December 31, 2015 or the $5000 (full retail value) cap is reached. Available amount for this study is $4111. ($889 has been subtracted from the amount of your first order). Regretfully, no phone or we orders will be honored this discount.

NOTE: Please be advised materials ordered for research cannot be returned. See paragraph 10 in the RAP Terms and Conditions: http://psychcorp.pearsonassessments.com/pai/ca/support/rap/ResearchAssistanceProgram.htm.

If you have any questions regarding the order, please contact our Inbound Sales and Customer Support at 1-800-627-7271 for assistance.

The order has been sent to our Order Management group for processing.

On Fri, May 9, 2014 at 2:10 PM, Ledbetter, Tamera Louise <tlledbet@iuk.edu> wrote:

Sir,

Enclosed in the email attachments are the RAP Application and the letter requested to use the Watson-Glaser I Critical Thinking Appraisal Tool. Thank you for consideration for the assistance program.

If I am not chosen to receive assistance, I still need to use the appraisal tool for my capstone project. Please send me further instructions on how to continue the process for use of the appraisal tool.

Sincerely,

Tamera Ledbetter