



# “THE IMPACT OF A NEW PEDAGOGICAL INTERVENTION SIMULATION-BASED LEARNING IN NURSING EDUCATION: A SYSTEMATIC REVIEW”

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## ABSTRACT

**Introduction:** In recent years, simulation-based learning has become one of the most popular components of corporate training programs. It creates a setting that mimics real-world tasks and situations, allowing students to test their knowledge and apply principles. Human simulation is an educational process that can replicate clinical practices in a safe environment. Simulation, according to Shannon (1975), is “the process of designing a model of a real system and conducting experiments with this model for the purpose either of understanding the behaviour of the system or of evaluating various strategies for the operation of the system. It is a device that attempts to create characteristics of the real world (Alden and Durham, 2008). **Methods:** Quantitative studies published between 2017 and 2023 were undertaken for the narrative review. A comprehensive review of published literature and journal articles from PubMed, Google scholar, and Medline databases was done. Search strategy specific to each database was used. During initial search 6504 titles were retrieved and after screening 12 articles were selected for full text screening. Finally 12 research articles were selected based on the inclusion criteria. **Results:** Out of 12 articles, five research studies supported that Simulation-based training in medical courses is effective in enhancing communication skill, self-efficacy and clinical competence. Four research studies supported that Simulation-based education increases the knowledge retention and performance of nursing students. Three research studies supported that Simulation-based education improves clinical skills and clinical performance of nursing students. **Conclusion:** Simulation based learning is effective in improving nursing students' perceived competence, self-efficacy, and learning satisfaction. Simulated teaching is an innovative approach because students engage in genuine communication in playing their roles. Students have the opportunity to try out new behaviours in a safe environment, which helps them develop long-term motivation to master additional skills. In addition to encouraging genuine communication, active involvement, and a positive attitude, the simulated “real life” problems help students develop their critical thinking and problem solving skills. Multiple instructional strategies besides simulation are recommended to maintain nursing students' learning interests to achieve optimal learning outcomes

Keywords: Simulation, simulation based learning, nursing skills, clinical competence

## 1. INTRODUCTION

Simulation-based education is considered a key component in nursing students' learning and preparation for practice and professional life (Cant & Cooper, 2017; Ricketts, 2011). Over the last decades, the use of simulation as a pedagogic method and teaching strategy in nursing education has developed considerably, with the aim of bridging the gap between theory and practice through new and interactive teaching strategies (Bland & Tobbell, 2016). Simulation-based education has been revealed to be useful, beneficial and effective for students during their learning process. Past studies' results have been mainly positive, including benefits like improved decision-making and critical thinking, enhanced performance in clinical skills and improved ability to function in the clinical setting (Al-Ghareeb & Cooper, 2016; Sundler et al., 2015; Warren et al., 2016). Students' knowledge and confidence increased after simulation-based education, and they reported being more satisfied with simulation as a pedagogic method compared to other teaching and learning strategies (Warren et al., 2016).

Simulation, as a pedagogic method, enables students to learn how to reconcile theory with practice through different scenarios. The students work together in a supportive skills training environment (Cant & Cooper, 2017), while the teacher/faculty facilitates the simulation scenarios. The debriefing part following a simulated scenario provides a great opportunity for learning (Dreifuerst & Drecker, 2012). During the debriefing, the teacher/faculty facilitates a discussion among the participants based on the simulated scenario using (Gibbs' 1988) reflective learning cycle. This reflective cycle comprises six stages focusing on how to learn from experiences by:

- (1) Describing
- (2) Involving feelings
- (3) Evaluating
- (4) Analysing
- (5) Concluding
- (6) Planning for new personal acting/role-play. The goal is to enhance the understanding of the targeted subject

### 1.1. Aim

The aim of this review is to highlight the importance of simulation as a new teaching method among nursing students.

### 1.2. Objectives:

- To explore the changes in nursing students' perceived competence, self-efficacy, and learning satisfaction after exposures to simulation.
- To assess the effectiveness of simulation based learning among nursing students.

## 2. METHODOLOGY

### 2.1. Search Strategy methods

An electronic search of articles published in various journals from 2017 to 2023 was conducted. Search was restricted to only English language. The database search done was Pubmed, Medline and Google scholar.

#### 2.1.1. Types of Interventions:

Simulation based training, Simulation based education programme, High fidelity simulation based training, and simulation based learning.

#### 2.1.2. Types of Studies:

A randomized controlled trial with a pre-test and post-tests design, One-group repeated measurement experimental design, a mixed methods study incorporating quasi-experimental and qualitative components, non-equivalent control group pre- and post-test design, One-time post-test intervention design.

#### 2.1.3. Type of Participants:

Nursing fraternity, Nursing students.

#### 2.1.4. Settings

Nursing institutions

#### 2.1.5. Outcomes:

Enhancing communication skill, self-efficacy, clinical competence and knowledge retention.

#### 2.1.6. Delivery of Interventions

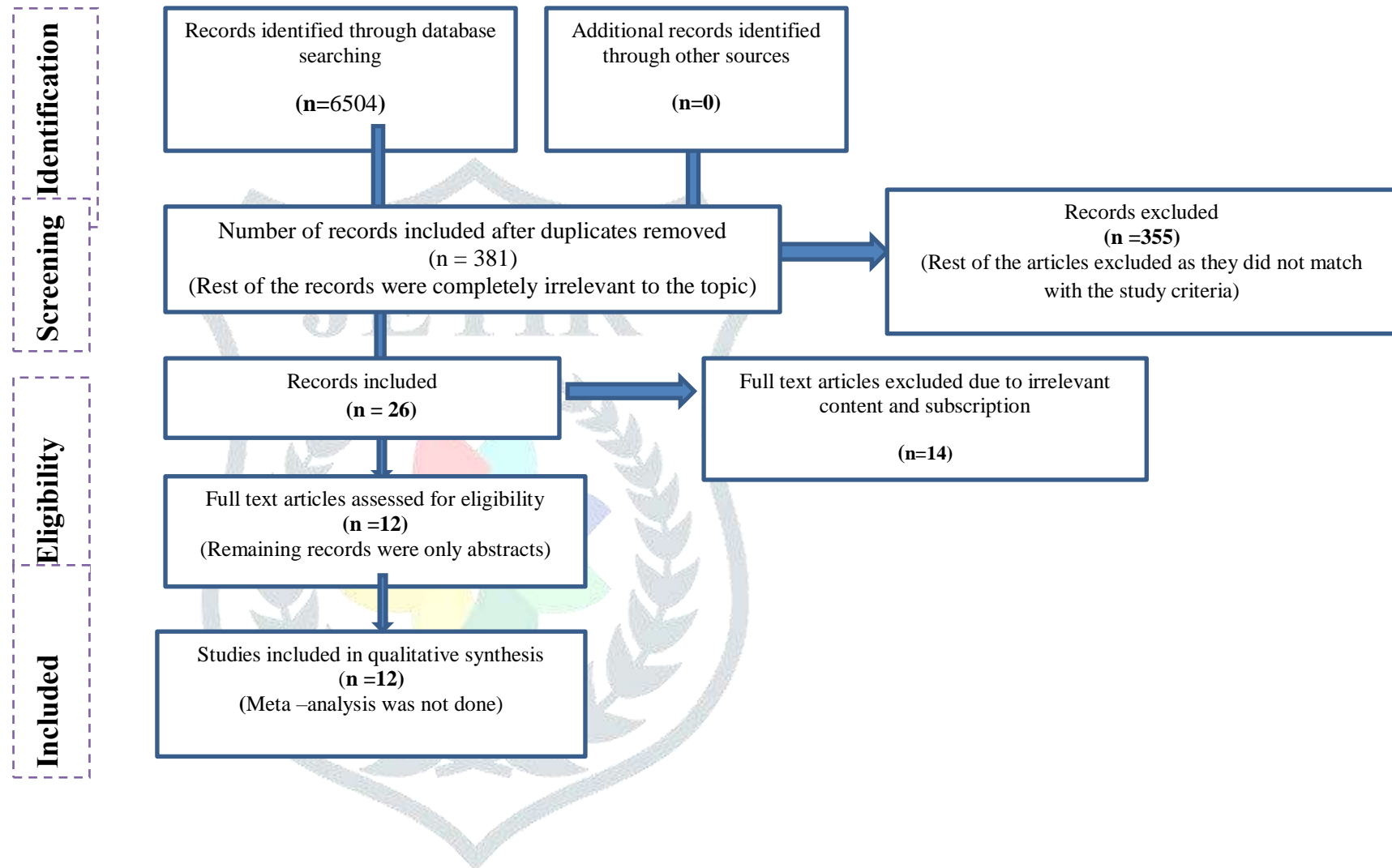
The systematic search was conducted by framing the terms individually and in combination with all and synonyms, also according to the database. In addition to this, a manual google scholar search was undertaken using the keywords and search synonyms from already found articles.

Initial search retrieved 6504 articles over which 381 articles were selected manually. Duplicates were removed and reviewed 26 articles for eligibility. 14 articles were excluded because of irrelevant content and subscription. Hence twelve articles were screened which includes quantitative and mixed studies.



### 3. RESULTS:

#### 3.1. PRISMA FLOW CHART



## 3.2. Table no.1: Data Extraction table

Sl.N and Author	Source and title	Country	Variables	Instruments	Sample and sampling technique	Design	Duration	Findings	Conclusion
1. Melba Sheila D, Souza, Ramesh Venkatesaperumal, Frieda S Chavez, Kader Parah and Devakirubai Jacob (2017)	Effectiveness of Simulation among Undergraduate Students in the Critical Care Nursing	Oman	Independent variable- Simulation Dependent variable- knowledge, performance, self-satisfaction and self-confidence.	Standardized simulation instruments like Knowledge and performance scenario questionnaire, Student Satisfaction and Self Confidence in Learning (SSSCL) questionnaire	100 students in the critical care nursing course. A convenience sample	One-time post-test intervention design.	8 weeks	Active learning, diverse ways of learning and high expectations were significantly higher with knowledge, self-satisfaction and self-confidence in the use of HFS among students compared to videos.	Knowledge, performance, self-satisfaction and confidence improved among critical nursing students exposed to high fidelity simulation.
2. Haukedal, T. A., Reiersen, I. Å., Hedeman, H., & Bjork,	The Impact of a New Pedagogical Intervention on Nursing Students'	Norway	Independent variable- Simulation-Based Learning. Dependent	Demographic data, multiple-choice questionnaire	113 students. 53 in intervention group	A quasi-experimental study	1 wk	The intervention group had significantly higher scores on a knowledge	Based on these findings, it was concluded that

I. T. (2018)	Knowledge Acquisition in Simulation-Based Learning: A Quasi-Experimental Study.		variable-Knowledge Acquisition.		60 in control group.  Convenient sampling technique.			test conducted after the simulations in comparison to the scores in the control group.	pedagogical underpinning of SBL, emphasizes improvement of students' prerequisites for learning and strengthens the debriefing, can positively influence students' knowledge acquisition.
3. Salwa A. Mohamed, I mad H.(2019)	The Effect of Simulation-Based Training on Nursing Students' Communication Skill, Self-Efficacy and Clinical Competence for Nursing Practice.	Saudi Arabia	Independent variables: Demographic characteristics of students and previous experience with simulators.  Dependent variables: Communication skill (CS) and self-	1)Demographic data; 2)Communication skill (CS); 3) General self-efficacy Scale (GSES); and Clinical Competence Scale (CCS).	100 students from third and fourth years' undergraduate nursing students. Convenient sampling technique.	Quasi-experimental one-group pretest-posttest design.	4 months	Participants who received the simulation-based training, showed statistical significant improvement in communication skill, self-efficacy,	Simulation-based training in medical courses is effective in enhancing communication skill, self-efficacy and clinical competence. Multiple-patient simulations

			efficacy (SES) and clinical competence (CC).					and clinical competence scores after participation in the simulation program.	as a teaching-learning strategy in the nursing curriculum are highly recommended.
4. Padilha JM, Machado PP, Ribeiro A et al.(2019)	Clinical Virtual Simulation in Nursing Education: Randomized Controlled Trial	Portuguese	Independent variable: clinical virtual simulation. Dependent variable: knowledge retention, clinical reasoning, self-efficacy, and satisfaction with the learning experience.	Knowledge assessment by true or false and multiple-choice test. Learner Satisfaction with Simulation Tool- a 10-point Likert scale General Self-efficacy Scale, a 5-point Likert scale.	Total of 42 students. (21 per group, experimental and control group) Simple random allocation	A randomized controlled trial with a pretest and posttests design.	3 months	The results showed the existence of statistically significant differences in knowledge retention after the intervention, knowledge retention 2 months later and in learning satisfaction. The students in the experimental group presented	The introduction of clinical virtual simulation in nursing education has the potential to improve knowledge retention and clinical reasoning in an initial stage and over time, and it increases the satisfaction with the learning experience among nursing

								better outcomes in knowledge retention and learning satisfaction than students in the control group.	students.
5. Noha H. AbdElfattah , Galal A. EL-Kholy, Amal A. Hassan Omran, Hanan E. Hassan (2019)	Effect of Simulation on Students' Achievement in Normal Labor Module.	Egypt	Independent variable- simulation on normal labour  Dependent variable- Achievement of students in Normal Labor Modules	- structured interview questionnaire  Students' practice observational checklist.	120 students' were included.  A convenient sampling technique.	A Quasi experimental design (Study and control), was used.	2 days	Students who received simulation based teaching acquired higher level of knowledge and practice than students who received routine academic teaching.	Simulation based teaching should be integrated in the practice training for students before their contact with actual woman in the labor unit.
6. Miok Kim , Juyoung Ha.(2020)	Simulation-based education program on	Korea.	Independent variable- Simulation-based	Checklist	64 nursing students.  Experimen	Quasi- experimental study used a	12 days	The experimental group had statistically	The results of this study indicate that the

	postpartum hemorrhage for nursing students		education program on postpartum hemorrhage  Dependent variable- Students competency.		tal group-33, control group-31.	non-equivalent control group pre- and post-test design.		significantly higher scores for clinical performance.	simulation-based postpartum care education program for women with postpartum hemorrhage was effective for developing students' competency, implying that a similar program should be integrated into the clinical training component of the maternal nursing curriculum.
7. Habibli, T., Najafi Ghezaljah, T., & Haghani, S.(2020)	The effect of simulation-based education on nursing students' knowledge	Iran	Independent variable- simulation-based education  Dependent	Modified knowledge assessment questionnaire and a modified performance	49 nursing students (intervention (n=28) and control	Quasi experimental pretest-posttest study with a control group	3 months	The students' knowledge in the intervention group immediately	Simulation-based education increased the knowledge and performance

	and performance of adult basic cardiopulmonary resuscitation: A randomized clinical trial		variable-knowledge and performance of adult basic cardiopulmonary resuscitation.	evaluation checklist about BLS in adults.	(n=21)) Simple random allocation.	design.		after (p<0.001) and three months after the intervention (p<0.05) were significantly higher than the control group. The mean scores of performance immediately after (p<0.001) and three months after the intervention (p<0.001) were significantly higher than the control group.	of nursing students in the field of BLS-CPR.
8.Mehdipour –Rabori, R., Bagherian, B., &	Simulation-based mastery improves	Iran	Independent variable-Simulation-based	Demographic information questionnaire and the	105 Experimental group-	Quasi-experimental study with two	2 yrs	The results showed no significant differences	Mastery learning was more effective in

Nematollahi, M. (2021)	nursing skills in BSc nursing students: a quasi-experimental study.		mastery Dependent variable- nursing skills	checklist.	53 Control group-52.	groups (the control - and intervention).		between the two groups before the intervention ( $p > 0.05$ ). In addition, students' performance in the intervention and control groups improved significantly at the post-test compared with the baseline ( $p < 0.05$ ). Furthermore, the Cohen test implied that the simulation-based mastery model used by the intervention group was significantly more effective	improving clinical skills in undergraduate nursing students. The results suggest that other nursing and health programs can be developed by implementing a mastery-based learning model.
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								than the traditional training used by the control.	
9. Chang-Chiao Hung, Hsueh-Fen S Kao et al.(2021)	Effects of simulation-based learning on nursing students' perceived competence, self-efficacy, and learning satisfaction: A repeat measurement method.	Taiwan	Independent variable: simulation-based learning Dependent variable: nursing competence, self-efficacy, and learning satisfaction.	Self-administered questionnaires	79 senior nursing students. Convenient samplings Technique	One-group repeated measurement experimental design	3 weeks	There were statistically significant improvement in nursing competence, self-efficacy, and learning satisfaction scores after repeated exposures to simulation.	Simulation based learning is effective in improving nursing students' perceived competence, self-efficacy, and learning satisfaction. Multiple instructional strategies besides simulation are recommended to maintain nursing students' learning interests to achieve optimal

									learning outcomes of the course across a semester.
10. Manashi Sengupta, Lireni C. Tungoe. (2021)	Knowledge on Simulation based learning in nursing education among nursing fraternity in selected nursing institutions of India”	India	Independent variable- simulation based training Dependent variable- Knowledge on simulation based learning in nursing education	Tool I: Structured knowledge questionnaire based learning in nursing education Tool II: Feedback	A total of 203 nurses were selected using convenient sampling technique.	Descriptive research design	2 days	The findings of the study revealed that the participants have acquired adequate knowledge on simulation based learning in nursing education and a given good feedback on simulation based learning.	Simulation based education in nursing education is very helpful as it bridge the gap between theory and practical through innovative teaching learning process. It creates interest to the teacher as well as the learner. Students get to practice their procedure in those standardized patient before

									they actually practice with the patients.
11. Ayla, D., Emine Ozer, K., Betulay, K., & Fatma Ilknur, C.(2022).	Examining the Effect of Simulation-Based Teaching in Internal Medicine Nursing on Nursing Students	Turkey	Independent variable-Simulation-Based Teaching Dependent variable-Self-efficacy, Anxiety, Self-confidence, Satisfaction	Demographic Data, Generalized Perceived Self-efficacy Scale, Spielberg State Anxiety Inventory, Student Self-Confidence Scale and Satisfaction Scale. Interview Form consisting of semi structured questions was used for qualitative data.	127 students. No sampling method was used in the study since it was aimed to reach the entire population	Mixed research design including qualitative and quantitative data	3 days	Students' state anxiety level was moderate before the simulation. The pre-simulation anxiety level of the students was higher than the post-simulation level; the generalized perceived self-efficacy was at a good level. Satisfaction and self-confidence regarding the simulation were high after applications. As students' generalized perceived	Simulation activities were effective in improving the teaching of internal medicine nursing and that these practices positively affected the anxiety and learning satisfaction and self-confidence of those who perceived their self-confidence as high. It is considered that the use of simulation method in internal

								self-efficacy scores increased, their anxiety levels decreased, satisfaction with learning and self-confidence increased, but academic achievement was not affected. From the qualitative data, the main themes were grouped as “Reactions during simulation” and “Self-evaluation after simulation”.	medicine nursing courses will increase teaching success.
12. Ka Ming Chow, Ricky Ahmat.(2023 )	Is high-fidelity simulation-based training in emergency nursing effective in	Hong Kong	Independent variable-high-fidelity simulation-based training in emergency nursing.	Student Engagement Questionnaire (SEQ) Nursing Anxiety and Self-	255 final-year pre-registration nursing students (183 bachelor	A mixed methods study incorporating quasi-experimental and	2 months	Post-intervention , the participants reported significant improve	High-fidelity SBT in emergency nursing effectively enhanced nursing

	<p>enhancing clinical decision-making skills? mixed methods study</p> <p style="text-align: center;">A</p>		<p>Dependent variable: generic capabilities, self-confidence and anxiety during clinical decision-making</p> <p>Research variable: learning experiences and opinions of the training</p>	<p>Confidence with Clinical Decision-Making Scale.</p> <p>Satisfaction with Simulation Experience Scale (SSES).</p> <p>Focus group interview with semi-structured interview guide.</p>	<p>and 72 master students).</p> <p>Convenient sampling technique.</p>	<p>qualitative components.</p>		<p>nts in generic capabilities, selfconfidence and anxiety during clinical decision-making. They expressed a high level of satisfaction with the simulation experience.</p> <p>Based on the content analysis, four themes were generated from the qualitative data: (1) a challenging but enjoyable learning experience; (2) facilitating clinical decision-making; (3) enhancing self-</p>	<p>students' generic capabilities and selfconfidence and alleviated anxiety during clinical decision-making. The students were highly satisfied with their simulation experiences. Further studies should include a control group to confirm the advantages of high-fidelity SBT over traditional clinical experiences or other teaching methods.</p>
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								confidence; and (4) refining the high-fidelity SBT.	
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### 3.3. Summary of findings:

The available literature refined to get 10 quantitative and 2 mixed approaches.

Out of 12 articles, five research studies supported that Simulation-based training in medical courses is effective in enhancing communication skill, self-efficacy and clinical competence. Four research studies supported that Simulation-based education increases the knowledge retention and performance of nursing students. Three research studies supported that Simulation-based education improves clinical skills and clinical performance of nursing students.

### 4. DISCUSSION:

More number of studies has demonstrated the need for simulations in preparing nurses for clinical practice (Plastere & Mills, 1983) (Wildman, 1997) (Wies & Guyton-Simmons, 1998) (Vandrey & Whitman, 2001).

A study supported that the knowledge, performance, self-satisfaction and confidence improved among critical nursing students exposed to high fidelity simulation. (Melba Sheila D, Ramesh Venkatesaperumal, Frieda S Chavez, Kader Parah and Devakirubai Jacob, 2017).

Pedagogical underpinning of SBL, emphasizes improvement of students' prerequisites for learning and strengthens the debriefing, can positively influence students' knowledge acquisition. (Haukedal, T. A., Reieron, I. Å., Hedeman, H., & Bjork, I. T. -2018).

Simulation-based training in medical courses is effective in enhancing communication skill, self-efficacy and clinical competence. Multiple-patient simulations as a teaching-learning strategy in the nursing curriculum are highly recommended. (Salwa A. Mohamed, Imad H-2019).

The introduction of clinical virtual simulation in nursing education has the potential to improve knowledge retention and clinical reasoning in an initial stage and over time, and it increases the satisfaction with the learning experience among nursing students. (Padilha JM, Machado PP, Ribeiro A et al-2019).

Simulation based teaching should be integrated in the practice training for students before their contact with actual woman in the labor unit. (Noha H. AbdElfattah, Galal A. EL-Kholy, Amal A. Hassan Omran, Hanan E. Hassan -2019).

Simulation based learning is effective in improving nursing students' perceived competence, self-efficacy, and learning satisfaction. Multiple instructional strategies besides simulation are recommended to maintain nursing students' learning interests to achieve optimal learning outcomes of the course across a semester. (Chang-Chiao Hung, Hsueh-Fen S Kao et al-2021).

Simulation based education in nursing education is very helpful as it bridge the gap between theory and practical through innovative teaching learning process. It creates interest to the teacher as well as the learner. Students get to practice their procedure in those standardized patient before they actually practice with the patients. (Manashi Sengupta, Lireni C. Tungoe-2021).

#### 4.1. Importance in Education

Nurses and their training are fundamental elements of the effectiveness of the system; therefore, special attention is paid and must be paid. Currently, simulation-based training as an educational tool in nursing science has multiple uses. Simulation constitutes a focal point for nursing science and for the progress of nursing students. This requires investment of funds in the establishment of appropriate laboratories by nursing schools, time for simulation as provided for in the curricula, and educators who are properly trained to create various scenarios and operate simulators. Educators play a significant role in regulating the entire procedure and through their knowledge and skills, they facilitate learning. Educators also must ensure that an atmosphere of psychological safety is created, in order to enable students to act in this setting, thus reducing other concerns and problems.

#### 4.2. Importance in Nursing Practice

The implementation of simulation helps the students to practice their clinical and decision-making skills for some significant issues they may face in their daily work. The protected environment and the sense of security enhance students' self-esteem and confidence, thus promoting learning. In this way, the gap between theory and practice is substantially will be reduced.

### 4.3. Limitations

- Database search was limited
- Search strategy was refined to simulation based learning
- Meta- analysis will give more accuracy
- Confined to area of Nursing

### CONCLUSION

Simulation based learning is effective in improving nursing students' perceived competence, self-efficacy, and learning satisfaction. Simulated teaching is an innovative approach because students engage in genuine communication in playing their roles. Students have the opportunity to try out new behaviours in a safe environment, which helps them develop long-term motivation to master additional skills. In addition to encouraging genuine communication, active involvement, and a positive attitude, the simulated "real life" problems help students develop their critical thinking and problem solving skills. Multiple instructional strategies besides simulation are recommended to maintain nursing students' learning interests to achieve optimal learning outcomes.

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