Simulation Based Learning in Nursing Education: Perceived Benefits and Barriers by Nurses Educators and Students

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Abstract

Background: Simulation-Based Learning (SBL) bridges the gap between theory and clinical practice, enhancing patient safety and critical thinking in nurses. **Aim**: To assess perceived benefits and barriers by nurse educators and students about simulation-based learning. **Design**: A descriptive research design was used in this study. **Setting**: This study was conducted at faculty of nursing Helwan University. **Subjects**: All nurse educators who are involved in clinical teaching (N=59) and all students in the second and third year at the faculty of nursing. (N=464). **Tools**: Three tools were used for data collection: Nurse Educators and Students' knowledge about simulation-based learning, Nurse Educators' perception about simulation-based learning questionnaire ad Nurse Students' perception about simulation-based learning questionnaire. **Results:** Slightly more than two-thirds of nurse educators had satisfactory knowledge and a positive perception of simulation-based learning, while less than one-fifth of nurse students shared a positive perception, despite the majority of educators recognizing its benefits. **Conclusion:** The majority of nurse educators' level had satisfactory knowledge and a positive perception of simulation in education, while three-quarters of nurse students also viewed it positively. **Recommendation:** Conduct training programs about simulated based learning to improve nursing educators' knowledge and practice.

Keywords: Benefits, Barriers, Nurse Educators, Nurse Student, Simulation based learning.

Introduction:

Simulation is one of the best teaching strategies that bridge the gap between theory and practice; it is a technique for completing real life experiences with guided experiences with faithful imitation of the real world in a fully interactive way *(Venkatesan, 2022)*. Also, it is one of the newer methodologies that may play a pivotal role to involve the students as an active participant. Simulation allows the students to learn in a real like situation with the manikins and actors known as standardized patients for the different situation designed by the teachers in a controlled environment *(Bisht et al., 2022)*.

Simulation in nursing education was used to teach and practice psychomotor skills. Through simulation-based training, learners can acquire knowledge and skills from their mistakes and receive immediate feedback from instructors, which can help improve their confidence and competence in providing patient *(Abdalla & Idris, 2023)*. Simulation-based training has gained increased attention in nursing education as a valuable tool that can aid in the acquisition of clinical and the ability to think critically. Simulation based training within the context of teaching nursing create an authentic clinical environment that enables students to practice and enhance their abilities in a realistic clinical setting *(Sterner et al., 2023)*.

The use of simulation in nursing education allows nurse educators to replicate what happens in real environments and enable students to experience experiential learning *(Tonapa et al., 2023)*. Nursing instructors play a vital part in Simulation- Based Learning (SBL) by creating scenarios that stimulate students to develop their cognitive process, especially decision-making skills, and solve problems in clinical practice *(Uppor et al., 2023)*.

Simulation based learning (SBL) gives advantage for students in the development of self-evaluation, time management, teamwork, clinical decision-making and communication skills for patient safety and care. It also allows students to practice procedures and become familiar with clinical situations. Nurse student training is a must, to learn the procedure on patients. Sometime because of patient conditions and situations it is not possible to learn properly. Simulator is the one which allows the healthcare personnel to practice procedure on them and allow end number of mistakes. Student nurses learn the procedure by their own mistake *(Kudari, 2023)*.

The capability to receive direct and immediate feedback is another beneficial hallmark of simulation, which may not always exist in the clinical workplace. Studies reported that teaching with simulators enhanced learning outcomes regarding diagnosis and management *(Alshehri et al., 2023)*. Despite the widely reported benefits of SBE, several challenges and barriers to implementation of SBE has been identified such as financial constraints, time constraints, lack of faculty training and expertise, limited access to resources, resistance to change, ethical considerations, issues with validation and standardization, and privacy and confidentiality concerns *(Almotairy et al., 2023)*.

A systematic review was conducted to synthesize the research findings related to simulation challenges in medical education and provide recommendations to overcome these difficulties and found that student disengagement, human resources, technical issues, and time constraints respectively were the challenges of simulation-based training and concluded that nurse educators need to discover, test, and find ways to improve existing challenges. If potential challenges are handled, the application of simulation in teaching will increase, and the quality of student learning will be significantly improved *(Tram & Lam, 2022)*.

Recent global studies have shed light on the perceived benefits and barriers associated with simulation-based learning (SBL) among nurse students and educators across diverse healthcare settings. Synthesized data from various countries revealed consistent findings regarding the advantages of SBL in nursing education. Such as improvements in clinical skills acquisition, enhanced critical thinking abilities, and increased confidence among students in delivering patient care. Moreover, SBL was recognized for its potential to bridge the gap between theory and practice, offering students a realistic environment to apply theoretical knowledge to clinical scenarios *(Westerdahl et al., 2022)*.

Despite these advantages, faculty opposition to change, logistical difficulties, and resource limitations were among the common impediments to SBL observed. These results highlight the necessity for worldwide cooperation in removing obstacles and optimizing SBL incorporation into nursing curriculum to raise the standard of nursing education and, eventually, improve patient outcomes *(Lee et al., 2024)*. Another descriptive study was conducted at selected college of nursing, Chennai among 63 nursing faculties and reported that most of them (86%) had positive perception whereas 14% had neutral perception regarding simulation-based learning **(Venkatesan, 2022)**.

Significance of the study:

Due to issues with patient safety, clinical placements, ethics, the COVID-19 pandemic, simulation-based learning (SBL) has become an essential part of nursing education *(Sterner et al., 2023)*. Furthermore, due to a lack of chances and patient time, student nurses' inadequate clinical exposure impedes the development of their clinical abilities. Training using simulation provides an alternative approach to teamwork and skill building *(Powell et al., 2020)*.

Indeed, research in Egypt reveals simulation-based learning (SBL) benefits for nursing students and educators, including enhanced clinical skills acquisition, improved critical thinking, and improved patient safety through clinical judgment development *(Labrague, 2021)*. Additionally, by addressing the lack of clinical placement possibilities, SBL can enhance nursing education in Egypt; nevertheless, obstacles like infrastructure and resource limitations must be overcome *(Abdel-Hamid & Said, 2023)*. Finally, the findings of this study can help policymakers, curriculum designers, and nursing educators make well-informed decisions on the integration and use of simulation-based teaching techniques.

Subjects and Methods

Research design: Descriptive research design was utilized.

Setting: The study was conducted at Faculty of Nursing Helwan University.

Sample:

A purposive sample consisted of two groups:

First group: All nurse educators who are involved in the clinical teaching process in the second and third-year students at the faculty of nursing, Helwan University in the academic year 2021-2022 including male and female.

Second group: All nurse students in the second and third year at the faculty of nursing, Helwan University in the academic year 2021-2022 including male and female.

Inclusion criteria:

All nurse educators who are involved in the clinical teaching process. Faculty staff members include (lecturers and assistant professors) and their assistant include (clinical instructors and assistant lecturers).

Exclusion criteria:

Nurse educators who received training courses about simulation

Tools for data collection:

Three tools were utilized to collect data:

First tool: Nurse Educators' and Nurse Students' knowledge about simulation- based learning in nursing education; it was developed by the researcher after reviewing relevant literature **(Cant &Cooper 2019; Meum et al., 2020; Pan & Rajwani 2021)** to assess nurse educators' and nurse students' knowledge about simulation-based learning in nursing education.

This tool consisted of two parts.

Part I: Personal data for nurse educators and nurse students: this part included (age/year ,gender, and educational level in nursing, educational department, number of teaching subject, years of experience in clinical training Academic level, grade in last year and qualification of students).

Part II: Assessment of nurse educators and nurse students' knowledge about simulation-based learning: It is a self-administered questionnaire. It consisted of (17) questions about simulation-based learning in nursing education e.g., definition of simulation-based learning, importance of simulation- based learning, types of simulation-based learning, advantage and disadvantage of simulation-based learning ……. etc.

Scoring system: The questions were scored as (1) for correct answer and (zero) for incorrect answer .so, the total score was (17), and the cut point was done at 70%=12 grades. Total knowledge score was calculated as follows:

Satisfactory equal or more than 12 grades   (>70%).

Unsatisfactory equal or less than 12 grades   (<70%).

The second tool: Nurse Educator's perception questionnaire:

It was developed by the researcher after reviewing the relevant literature **(Baykara & Eyikara, 2018; Ilankoon et al. 2020)** to assess perceived benefits and barriers of nurse educators about simulation- based learning in nursing education. This part included questions about perceived benefits and barriers about simulation- based learning in nursing education.

Scoring system: Nurse educator's responses were measured on a 3 points Likert scale range from 1 = disagree, 2= neutral and 3= agree, total score (21). All perception questionnaire items were positively worded which made score (7) except items (15, 16, 17, 18, 19, 20, 21) which were revered items with score (1) and the cut point was done at 75% = 37 grades.

Positive perception equal or more than 37 grades   ($\geq$ 75%).

 Negative perception less than 37 grades   (< 75%).

The third tool: Nurse Student's perception about simulation-based learning questionnaire; it was developed by the researcher after reviewing the relevant literature **(Chan, et.al. 2021; Koukourikos et al. 2021; Iliadis et al. 2021)** to assess perceived benefits and barriers of nurse students about simulation-based learning in nursing education. This part included questions about perceived benefits and barriers about simulation-based learning in nursing education.

Scoring system: Nurse students' responses were measured on a 3 points Likert scale range from 1 = disagree, 2= neutral and 3= agree, total score (25). All perception questionnaire items were positively worded which made score (9) except items (17, 18, 19, 20, 21, 22, 23, 24, 25) which were revered items with score (1) and the cut point was done at 70% = 40 grades.

Positive perception equal or more than 40 grades   ($\geq$ 70%).

 Negative perception less than 40 grades   (< 70%).

Validity of study tools:

Face and content validity for the study tools were done.

Face validity:

Face validity of instrument appear to be an adequate of obtaining the data needed for the research study, it was examined by experts' opinions regard the tools format, layout, and clarity of parts.

Content validity:

Content validity is concerned with the scope or range of items used to measure the variable. In other words, are the number and type of items adequate to measure the concept. It was evaluated by either comparing the content of instrument with the literatures or by a panel of experts. The content validity of these instruments was tested by a group of experts to determine the appropriateness of each item to be included in the questionnaire sheet. Minor modifications were done based on the jury's recommendations ex (add student qualification on personal data & remove point from barriers about simulation-based learning on student sheet).

Reliability:

Tools were tested by Cronbach's alpha:

- First tool: the nurse student's knowledge questionnaire yield Cronbach's alpha showed (0.70).

- Second tools: the nurse student's perception questionnaire showed (0.77).
- Third tools: the nurse educator's e perception questionnaire showed (0.88).

Ethical considerations

   Prior study conduction, approval was obtained from the scientific research ethical committee at faculty of nursing, Helwan University. In addition, informed consent was obtained from every institute manager for data collection. The subjects were informed about aim of the study, anonymity and confidentiality were guaranteed. Written consent obtained from the study subjects before inclusion in the study. Subjects were informed that were allowed to predicate or not in the study and that, they had the right to windrow from the study at any time. Ethical, values and beliefs were respected during collection data.

Pilot study

   A pilot study was conducted on 10% of the study subjects (46 nurse students) and (6 nurse educators) from the middle of May 2022 to the beginning of June 2022. The aim of the pilot study was to confirm clarity, applicability of the tools and to estimate the time required for fulfilling the questionnaire sheets. Based on the pilot study, no modifications were done, and the final version was prepared for distribution to the nurse students and nurse educators. Those participants were included in the study sample.

Field work

   The actual fieldwork started at the middle of May 2022 and was completed by the middle of June 2022. The researcher met the dean of the faculty of nursing Helwan University to explain the aim of the study to gain approval for data collection. The researcher collected data by herself through meeting nurse educators and nurse students and explaining the purpose of the study to them in the study settings. The questionnaire sheets were completed by nurse educators and nurse students. The researcher went to faculty 3 days per week and was present during fulfilling the questionnaires to answer any question related to the study. The time needed by nurse educator to complete both of the study tools was ranged between (5-10) minutes and. the time needed by nurse students was ranged between (10-15) minutes. The researcher checked the completeness of each filled sheet after the nurse educators and nurse students completed it to ensure the absence of any missing data.

III-Administrative Item:

        To carry out the study, an official letter was issued from the Faculty of Nursing Helwan University explains the aim of the study to faculty of nursing Helwan University dean to obtain her permission for data collection in the faculty.

IV. Statistical design

        Upon completion of data collection, data was computed and analyzed using Statistical Package for the Social Science (SPSS), version 25 for analysis. Data was presented by using tabulation in the form of numbers and percent for statistical data description. Descriptive statistics for qualitative variables were presented in form of frequencies and percentages while mean ± standard deviation (± SD) was using for quantitative data. The significance level was set at p-value<0.05. Cronbach's Alpha coefficient was used for reliability test. ANOVA test was used for correlation between personal data and study scores while Pearson correlation was used for correlation between study scores.

Results:

Table (1) reveals that nurse educators were (n=59). The highest percentage of them was females in the age group 33 < 37 with mean ±SD 35.0 ± 4.2. Regarding their educational level in nursing, less than three quarters of them 74.6% had doctorate degree, while less than one quarter of them 18.6% had a master degree and only 5.1% had a bachelor degree in nursing. Also, more than one third of them 45.8% in medical surgical department, while more

than a quarter of them 30.5 % in pediatric department. They teach only one number of teaching subject 91.5% While, less than half of them have (47.5%). Regarding their years of experience. It was between 6-10 years of experience with mean ±SD 7.3±4.3. All of them (100%) did not attend training about simulation.

Table (2): shows that the majority 51.9 % of the study subject were males 48.1 % were females. Also, the table shows that more than half of them 68.1 % in the age group from 20 < 22 years while, more than quarter was in the age group 22 < 24 years with mean ± SD 21.1±0.9.

Regarding their qualifications, more than half of them 54.1% joined the faculty of nursing post nursing technical institute, while more than one third of them 45.9% joined post general secondary school. Meanwhile, more than half of them 52.1% in second academic year, while more than third of them 47.9 % in third academic year. Also, more than half of them 57.8% their grade in last year was good, while 18.3% of them their grade was excellent.

Table (3): Clarifies that most of nurse students 88.6% & 81.3 agreed upon those items simulation an integral part of clinical teaching and decrease gap between theories and practices by creating a safe with mean ± SD 2.87±0.39 & 2.79 ±0.46 respectively. While only 10.8% of them disagreed that simulation prepares the student for real life experience and speed the transition with mean ± SD 2.39 ± 0.67.

Table (4): Clarifies that **63.4% & 45.5%** of nurse students agreed upon those items "simulation cannot develop the students' emotional and intuitive awareness in using simulation. Also, it can provide a limited amount of preparedness, which is with mean ± SD **2.53±0.67 & 2.34 ±0.67** respectively. While less than quarter of nurse students 24.8**% & 24.6%** disagreed upon those items "simulation does not allow students to access medical records. And simulation is not real. Because of this, students tend to tense up during clinical situation with mean ± SD **2.11 ± 0.77 & 2.09±0.76.**

 Figure (1): shows that the majority 74.80 of nurse students had unsatisfactory level of total score knowledge about simulation- based learning. While, slightly more than one quarter of them 25.20 had satisfactory.

  Figure (2): shows that the highest percentage (59.3%) of nurse educators had positive perception about simulation- based learning in nursing education. While only (40.6%) had a negative perception.

  Figure (3): shows that the majority 72.9% of nurse educators had agreed upon simulation benefits, while only 1.7% of them disagreed.

  Figure (4): Shows that less than half 49.2% of nurse educators had agreed upon simulation barriers. Mean-while 6.8% disagreed.

Table (1): Frequency and percentage distribution of nurse educators' personal data (n=59).

Personal data	No.	%
Gender		
Male	18	30.5
Female	41	69.5
Age / year		
28-32	18	30.5
33-37	25	42.4
38-42	12	20.3
43-47	4	6.8

Mean ±SD	35.0 ± 4.2	
Educational level in nursing		
Bachelor's degree in nursing	3	5.1
Post graduate diploma	1	1.7
Master's degree	11	18.6
Doctorate degree	44	74.6
Educational department		
Obstetric	14	23.7
Pediatric	18	30.5
Medical surgical	27	45.8
Number of teaching subjects		
1	54	91.5
3	3	5.1
>3	2	3.4
Years of experience in clinical training		
0-5	19	32.2
6-10	28	47.5
11-15	12	20.3
Mean ±SD	7.3 ±4.3	
Previous training about simulation		
Yes	0	0%
No	59	100%

Table (2): Frequency and percentage distribution of nurse students' personal data (n= 464).

Personal data	No.	%
Gender		
Male	241	51.9
Female	223	48.1
Age / year		
20 – < 22	316	68,1
22 – < 24	148	31,9
Mean ±SD	21.1± 0.9	
Qualifications of students		

|		
Nursing technical institute	251	54.1
General secondary school	213	45.9
Academic level		
Second year	242	52.1
Third year	222	47.9
Grade in last year		
Excellent	85	18.3
Very good	105	22.6
Good	268	57.8
Fair	6	1.3
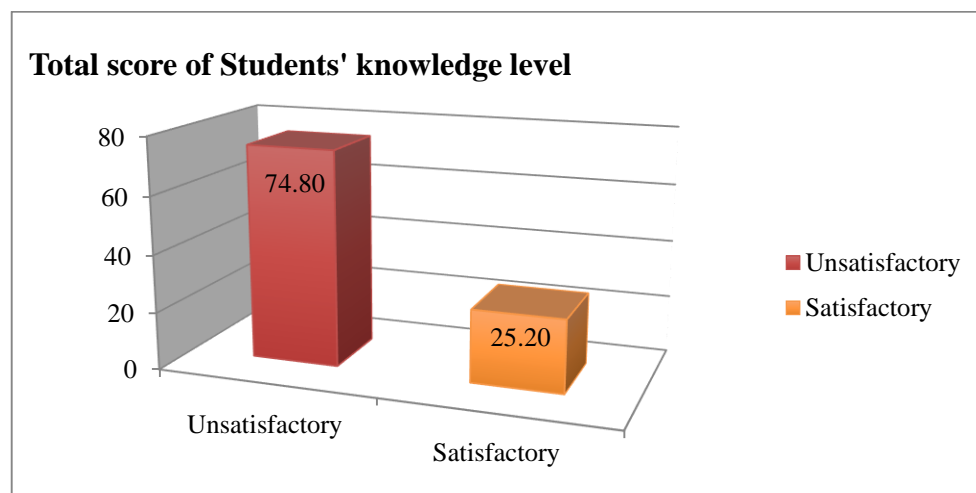
Figure (1) Distribution of nurse students' total score of knowledge level about simulation- based learning in nursing education (n =464).
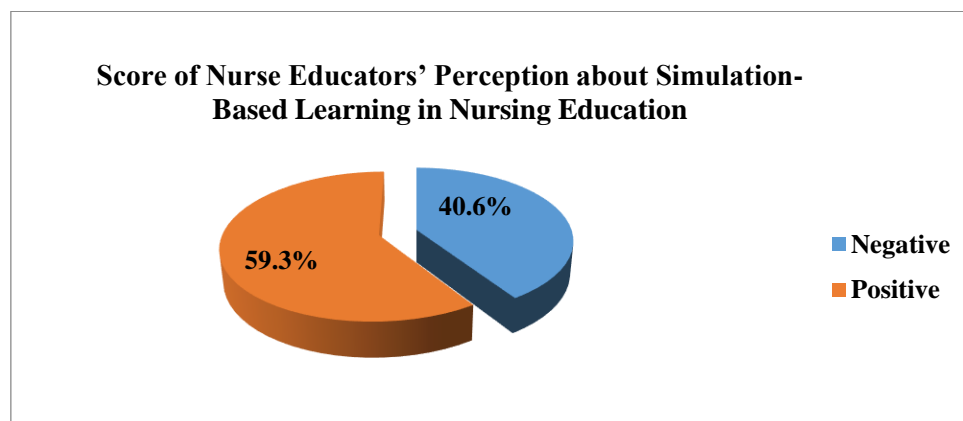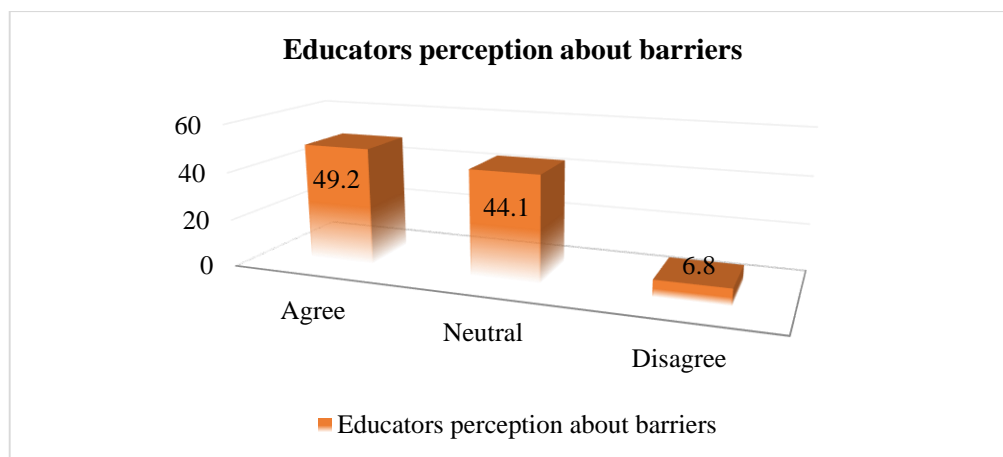

Figure (2) Score of educators' perception regards simulation -based learning in nursing education (n=59).
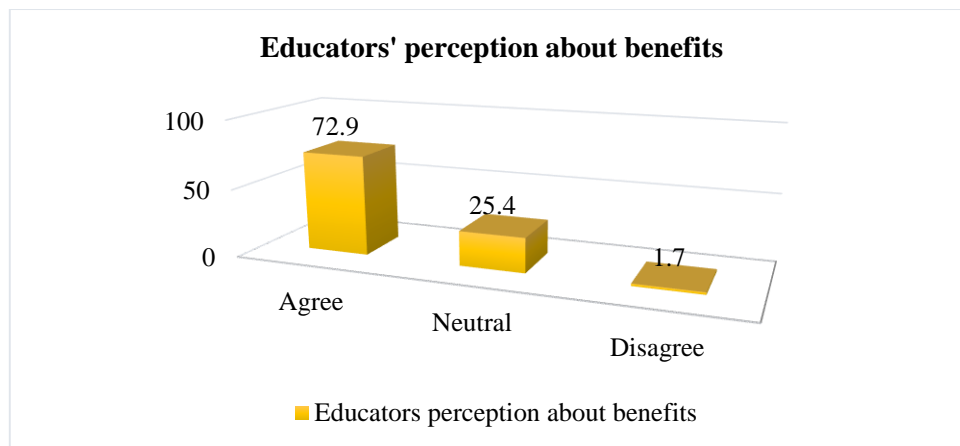
Figure (3): Total score of nurse educators' perceived benefits about simulation-based learning in nursing education (n=59)

Figure (4): Total score of nurse educators' perceived barriers about simulation- based learning in nursing education (n=59).

Table (3): Frequency distribution benefits perceived by nurse students about simulation-based learning (n=464).

Benefits Items	Agree		Neutral		Disagree		Mean	SD
	No.	%	No.	%	No.	%		
1. It is an integral part of clinical teaching and learning strategy in	411	88.6	44	9.5	9	1.9	2.87	0.39
2. Decrease gap between theories and practices by creating a safe	377	81.3	77	16.6	10	2.2	2.79	0.46
3. Allows deconstruction of clinical skills into their component parts,	346	74.6	94	20.3	24	5.2	2.69	0.56
4. Simulation based learning is considered an effective solution to	295	63.6	145	31.3	24	5.2	2.58	0.59

5. It is a type of experiential learning or practice expedience.	254	54.7	182	39.2	28	6.0	2.48	0.61
6. It is a constructivist learning model that provides learners with an	219	47.2	206	44.4	39	8.4	2.39	0.64
7. It provides an educational opportunity to facilitate higher level	208	44.8	225	48.5	31	6.7	2.38	0.61
It is strategy for clinical education to promote students' satisfaction	205	44.2	222	47.8	37	8.0	2.36	0.63
8. Prepares the student for real-life experience and speed the transition	229	49.4	185	39.9	50	10.8	2.39	0.67
9. Allows students to learn and practice nursing skills in less risky	372	80.2	84	18.1	8	1.7	2.78	0.46
10. Prepares students for critical thinking and self-reflection as well as	339	73.1	114	24.6	11	2.4	2.71	0.51
11. Allows students to apply abstract concepts to active hands-on	281	60.6	157	33.8	26	5.6	2.55	0.60
12. Allows students opportunity to study and analyze critical teaching	247	53.2	187	40.3	30	6.5	2.47	0.62
13. Provide students opportunities to adapt to diverse types of learning	230	49.6	196	42.2	38	8.2	2.41	0.64
14. It is fostering of multidisciplinary teamwork.	217	46.8	209	45.0	38	8.2	2.39	0.63
15. Helps students learn to make appropriate decisions at various points	224	48.3	203	43.8	37	8.0	2.40	0.63
Total	**278**	**59.9**	**158**	**34.1**	**28**	**6.0**	**40.6**	**0.57**
Mean ±SD	**40.6±0.57**							

Table **(3)** clarifies that most of nurse students 88.6% & 81.3 agreed upon those items simulation an integral part of clinical teaching and decrease gap between theories and practices by creating a safe with mean ± SD 2.87±0.39 & 2.79 ±0.46 respectively. While only 10.8% of them disagreed that simulation prepares the student for real life experience and speed the transition with mean ± SD 2.39 ± 0.67.

Table (4): Frequency distribution of perceived barriers by nurse students about simulation-based learning (n=464).

Barriers Items	Agree		Neutral		Disagree		Mean	SD
	No	%	No	%	No	%		
1. It is a time consuming for nurse student.	170	36.6	168	36.2	126	27.2	2.09	0.79
2. It doesn't allow students to be completely able to recreate real-life	175	37.7	178	38.4	111	23.9	2.14	0.77

3. It doesn't allow students to access medical records.	165	35.6	184	39.7	115	24.8	2.11	0.77
4. It is not real. Because of this, students tend to tense up during clinical situation.	159	34.3	191	41.2	114	24.6	2.09	0.76
5. It is generates a way of evaluating solutions but does not generate	176	37.9	196	42.2	92	19.8	2.18	0.74
6. It requires a significant amount of computer devices and is	197	42.5	199	42.9	68	14.7	2.28	0.70
7. Limits students to just observe procedures of patient care.	169	36.4	230	49.6	65	14.0	2.22	0.67
8. Simulation can provide a limited amount of preparedness, which is	211	45.5	200	43.1	53	11.4	2.34	0.67
9. Cannot develop the students' emotional and intuitive awareness in using simulation.	294	63.4	123	26.5	47	10.1	2.53	0.67
Total	**190**	**40.9**	**185**	**39.9**	**89**	**19.2**	**19.9**	**0.72**
Mean ±SD	**19.9±0.72**							

Table (4) clarifies that **63.4% & 45.5%** of nurse students agreed upon those items "simulation cannot develop the students' emotional and intuitive awareness in using simulation. Also, it can provide a limited amount of preparedness, which is with mean ± SD **2.53±0.67 & 2.34 ±0.67** respectively. While less than quarter of nurse students 24.8**% & 24.6%** disagreed upon those items "simulation does not allow students to access medical records. And simulation is not real. Because of this, students tend to tense up during clinical situation with mean ± SD **2.11 ± 0.77 & 2.09±0.76.**

Discussion:

To contribute to nurses' or nursing students' professional development and successful transition to competent practitioners (CNTs). CNTs are now being challenged to use simulation to develop more learner-centered educational programs, which could better facilitate learner engagement. As faculty preparation is a prerequisite for conducting quality simulation, it is critical that CNTs have the requisite knowledge and skills to use simulation to its full potential. However, data on CNTs' knowledge, attitude and practice towards simulation is limited *(Jin et al., 2022)*.

Regarding the nurse educators' knowledge about simulation-based learning, the present study results revealed that more than two thirds of nurse educators had correct knowledge about simulation in nursing education, whereas slightly less than one third of them had incorrect knowledge about simulation in nursing education with a total mean ±SD 11.5±2.3.

From the researcher's point of view this study results can be clarifying as there is increasing awareness of the nurse educators about the new innovation and methods in education strategies as well as may be most of them have knowledge regarding learning-based simulation from their courses in Ph.D. These findings were inconsistent with ***Bisht et al., (2022)*** who conducted a study entitled "Knowledge and perception on Simulation Based Education among the nursing faculty using simulation as a teaching methodology in India" and found that the mean knowledge scores regarding simulation-based education was 6.77± 1.72.

As regard nurse educators' perception about simulation-based learning, the present study results revealed that more than half of nurse educators had positive perception about simulation-based learning in nursing education. From the researcher's point of view this study results may be due to the positive result of using SBE in nursing which in turn improve the students` acheivment. These results were consistent with *Venkatesan, (2022)* who conducted a study entitled" Faculty Perception on Simulation Based Learning" who founded that most of them had positive perception whereas only less than fifth of them had neutral perception regarding simulation learning.

While, this study result is contradicted with *Alhassan et al., (2023)* who mentioned that the majority of the respondents confirmed that they were familiar with the use of simulation. Less than half of the respondents (50; 41.7%) indicated that they got exposed to simulation through a workshop purposely organized to train them on simulation. Also, a slight majority of the respondents agreed that they practice simulation.

Concerning nurse students' total score of knowledge level about simulation- based learning in nursing education, the present study results showed that less than three quarters of nurse students had unsatisfactory level of total knowledge about simulation-based learning. From the researcher's perspective, the results of this study can be interpreted as indicating that nurse educators may be focusing primarily on the practical aspects of Simulation-Based Education (SBE) strategies, without fully considering the comprehensive knowledge required for these educational strategies . These results of the current study were supported by *Yaday & Deepak, (2022)* who conducted a study entitled" Knowledge on Simulation Based Education (SBE) among the nursing faculty using simulation as a teaching methodology in India" and concluded that the mean knowledge scores regarding simulation-based education was 6.77 ± 1.72.

Regarding benefits perceived by nurse educators, the present study results revealed that the majority of nurse educators agreed upon those items "simulation an integral part of clinical teaching and it is an effective way to achieve the goals of the learning process". From the researcher's point of view this study results can be justified as the actual application of the nurses educators for the SBE causing improvement in the educational process in combination with the other educational strategies so, they considered it as an integral part of the education process.

These results were supported by *Alshehri., (2023)* who conducted a study entitled" Exploring faculty perception of simulation-based education: Benefits and challenges of using simulation for improving patient safety in cardiovascular diploma program" and reported that simulation is a safe learning environment (gives idea basic things about the working environment, knowing the symptoms of the patients, catheterizing the patient, knowing preparations for the procedure and post care), and the challenges of utilizing simulation (identify gaps between the theoretical and practical parts).

Concerning the total score of perceived benefits about simulation-based learning in nursing education, the present study showed that more than half of nurse student had agreed upon simulation benefits. From the researcher's perspective, these results may be due to the substantial benefits observed in simulation-based learning. This could be because students exhibit a strong desire to engage more actively in the learning process, thereby gaining greater opportunities to derive higher levels of benefits from simulation-based learning .These results were supported by *Gebreheat, Whitehorn and Paterson, (2022)* who conducted a study entitled "Effectiveness of Digital Simulation on Student Nurses' Knowledge and Confidence: An Integrative Literature Review" and founded that digital simulation with realistic, immersive and interactive characters had a positive impact on students' learning outcome in terms of knowledge acquisition and self-confidence and focus on combining digital simulation with face-to-face simulation will enhance learning.

Conclusion:

The study results concluded that:

Slightly more than two thirds of nurse educators had satisfactory level of knowledge about simulation in nursing education. In addition, more than one third of nurse students had satisfactory level of total knowledge about simulation in education. Furthermore, about more than half of nurse educators had a positive perception about simulation in education. Meanwhile three quarters of nurse students had positive perception regarding simulation in education respectively. Additionally, the highest percentage (72.9% & 59.9%) of nurse educators' and nurse students' had a positive perception about benefits of simulation in education respectively. Finally, less than half (49.2% & 40.9%) of nurse educators' and nurse students' had a positive perception about barriers of simulation in education respectively.

Recommendation:

Based on the current study findings, the following recommendations were suggested:

I-   Educational institutions:

1-   Provide advanced infrastructure by providing simulated laboratories and a sufficient number of stimulators to facilitate educational process.
2-   Overcome barriers and improve the utilization of stimulated based learning as an essential education strategy
3-   Hold scientific conferences and seminars to spread the concept of simulated based learning.

II-   Nurse educators:

1-   Conduct and debrief inter-professional simulation scenarios with high learning environment.
2-   Evaluate the effectiveness of simulated based learning based on feedback from nursing students.
3-   Use the outcomes of the simulated based learning evaluation to improve clinical outcomes.

III- Further studies:

1-   Examine instructional strategies used by nurse educators in simulation- based learning courses that affect students' satisfaction.
2-   Evaluate the simulation effect on nurses' learning outputs for more evidence that simulation would be beneficial for nurses' improvement.

Reference

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