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Simulation based learning for second year undergraduate nursing students: Barriers and Enablers

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Abstract: **The inclusion of simulation based learning, as an innovative teaching strategy in the undergraduate clinical nursing curriculum is becoming an important foundation for many nursing programs for improving the educational outcomes.**

The aim of this study was to identify barriers and enablers for simulation based-learning perceived by the second year undergraduate nursing students

Design: descriptive correlational design was used.

Setting: this study was conducted in the clinical Sim-Man skills laboratory of Medical-Surgical Nursing Department of the Faculty of Nursing-Menoufia University-Egypt.

Sample: a random sample of 240-second year undergraduate nursing students and a convenience sample of seventeen Academic staff members from the Faculty of Nursing who finished their Master or Doctorate degree were selected.

Tools: I. A structured survey questionnaire: it was designed by the researcher after a thorough literature review and based on relevant studies to include: A). Socio-demographic data: Study subjects' sex. B). A structured barriers and enablers questionnaire: It was developed by the researcher and comprised of 20 items for describing point of views of both nursing students and academic staff members about barriers and enablers toward simulation based learning. II. A 3-points Likert scale; was developed by the researcher to identify barriers and enablers regarding simulation based learning. All selected questionnaire items were relevant to the two concepts; barriers, and enablers. It consisted of 25 items: 8 items for assessing barriers and 17 items for assessing enablers.

The main results; barriers for simulation was 100% & 79.6% of faculty staff and nursing students respectively agreed that; insufficient numbers of simulators and regarding enablers 64.7% & 65% of faculty staff and nursing students respectively agreed that; simulation give a semi-realistic experience. In addition, the current study revealed that, 100% of faculty staff and 87.1% of nursing students agreed that enablers are more than barriers.

Conclusion: Overall, the current study concluded seven barriers for simulation based-learning and seventeen enablers.

Recommendations: There is a great need for; frequent simulation training programs for academic staff, allowing simulators' technological support on a periodical basis, identifying challenges for simulation-based learning, building the scientific evidence which supports the use of simulation in nursing education with careful consideration to risk sensitization and outcome measurement, initiating a link between students and academic researchers for adoption of research findings and replication of the study with a larger sample of students from different program levels.

Keywords: **Simulation based learning - Barriers - Enablers - Nursing students.**

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1. INTRODUCTION

Simulation-based learning is aiming at bridging the gap between theory and practice through using innovative teaching strategies and thus it is considered now the core in preparing nursing students' for practical and professional life [1].

Simulation is designed to imitate the clinical environment and replicate the clinical situation, enabling students to engage and practice in a safe non-threatening environment and prepare them for professional and practical life [2]. Simulation-based education approaches are effective in improving nursing students' knowledge acquisition through an interactive process [3, 4].

Simulation provides the opportunity for students to demonstrate knowledge and skills learned within their educational program as well as the opportunity to practice decision-making and critical thinking. It also facilitates engaging and authentic learning opportunities in realistic but non-threatening environments [5, 6].

Simulation based education is gaining attraction in the health care with the wealth of evidence to prove its benefit developing rapidly. Now there are proven benefit for skill acquisition, communication, knowledge development, recognition and management of clinical deterioration all of which translates into improved patient safety and health care outcomes. This evidence is international and across all disciplines and healthcare sectors [7].

As the use of different simulation strategies in nursing education increases, evidence of its impact on learner self-confidence continues to grow. However, evidence to demonstrate an actual, positive influence on learner competence remains inconsistent. This lack of clear evidence supporting increased clinical competence challenges for faculty seeking effective teaching strategies [8].

Simulation-based learning is gaining popularity worldwide as undergraduate nursing programs are looking for evidence that support the use of high fidelity simulation (HFS) and guide best practices in the use of simulation to improve learner outcomes [9]. Simulation resembles many of the physical features of an actual patient so it provides students with opportunities to practice their clinical procedures and make errors without causing actual patient harm [10]. It also enhances decision-making skills through various real-life situational experiences [9,10].

There is a range of low to high fidelity simulations are used in nursing education as teaching aids, especially at the undergraduate level. Despite the prevalence of high-fidelity human patient simulator manikins (HPSMs) in nursing education, nursing educators encounter challenges when introducing new teaching methods or technology [5].

Table 1: A typology of fidelity elements in simulation-based education

Tool	Description
Partial task trainers **(low-tech simulators)**	Replica models or manikins used to learn, practice & gain competence in simple techniques and procedures
Peer to peer learning	Peer collaboration used to develop and master skills – such as basic health and physical assessment
Screen-based computer simulators	Programs used to acquire knowledge, to assess competency of knowledge attainment and to provide feedback related to clinical knowledge and critical-thinking skills.
Virtual reality	Combines a computer-generated environment with tactile, auditory and visual stimuli provided through sophisticated partial trainers to promote increased authenticity
Haptic systems	A simulator that combines real-world and virtual reality exercises into the environments
Standardized patients	Uses case studies and role-playing in the simulated learning experience; individuals, students or paid actors are taught to portray a patient in a realistic and consistent manner

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Tool	Description
Full-scale simulation **(medium to high fidelity)**	Simulation that incorporates a computerized full- body manikin that can be programmed to provide realistic physiologic response to practitioner actions; these simulation require a realistic environment and the use of actual medical equipment and supplies

Source: adapted from Decker, S., Sportsman, S., Puetz, L. & Billings, L. (2008) The evolution of simulation and its contribution to competency. Journal of Continuing Education in Nursing 39 (2), 78. [6]

High fidelity simulation (HFS) is not complicated like basic simulators because it included aspects of realism related to the physical and psychological learning environment [6]**.** High-fidelity simulation (HFS) has been proposed as a novel, supplemental teaching-learning strategy to enhance and ascertain the cognitive, affective, and psychomotor domains of active learning [11]. HFS is defined as a replicated clinical experience using a computer-driven, full-bodied simulator with physiological responses in interventions. Common, computer-driven simulators used for HFS include Laerdal's Sim Man and METI's Stan [12,13]. These simulations give a realistic context that emulates an actual clinical scenario and incorporates visual, tactile, and auditory cues. The learner is engaged in deliberate practice to meet cognitive, affective, and psychomotor objectives [14].

There are three core components for effective simulation education: a pre-briefing, the simulation exercise, and a post-debriefing [15]. The debriefing phase is important for student as it permits unrestricted use, distribution, and reproduction and Promoting reflection [16]. Reflectivity during debriefing phase is thought to be one of the most important factors influencing learning in simulation-based education [16] and this can be achieved through peer or instructor feedback, or reflective video review of performance [17]. This enables integration of knowledge and skills and improves confidence [18].

Simulation has become an integral part of nursing education. To spark motivation to use simulation, educators and administrators need to be exposed to simulation to identify the advantages of its application [19].

Reducing simulation barriers will result in strengthening educators and facilitators, and implementing incentive programs for integrating simulation have been successful in using this pedagogy. Scheduling simulation activities to correlate with the theory content in the curriculum of an accelerated entry-level master program is challenging for educators. However, literature supports designating a simulation lab coordinator to serve as a resource for faculty that is not familiar or comfortable with simulation is essential for developing and maintaining a quality simulation program [20].

While simulation use in nursing programs continues to increase, it is important to understand the prevalence of this new technology in nursing education. The National Council of State Boards of Nursing reported that about 1,060 pre-licensure nursing programs in the United States describing use of simulation as a mean of nursing education [21].

Moreover, although simulation-based education has increased in both extent and scope in many nursing education programs in Europe, USA, Asia, the Middle East and Australia, the literature shows a lack of implementation and research on simulation in low- and middle-income countries [22,23,24]. To the best of our knowledge, very little number of studies have highlighted simulation-based education in nursing education programs in Egypt [7].

2. AIM OF THE STUDY

The aim of this study was to identify barriers and enablers for simulation based learning perceived by the second year undergraduate nursing students.

2.1. Research questions:

1. Is there any significant relationship between the respondents' perceptions regarding barriers and enablers facing the second year undergraduate nursing students during simulation- based education according to their point of views?

2. Is there any significant relationship between faculty staff members and nursing students regarding enablers for simulation- based learning?

3. Is there any significant relationship between faculty staff and nursing students regarding barriers for simulation- based learning?

4. Is there any significant relationship between faculty staff and nursing students regarding barriers and enablers scale total score for simulation- based learning?

5. Is there any significant relationship between students' sociodemographic characteristics and their answers/perceptions for simulation-based learning barriers and enablers questionnaire?

6. Is there any significant relationship between students' sociodemographic characteristics and barriers and enablers scale total score for simulation-based learning?

2.2. Operational Definitions: barriers: is anything can obstacle the use of simulation in nursing education.

Enablers: Is anything can enhance the use of simulation in nursing education.

3. SUBJECTS AND METHOD

Design: A descriptive correlational design was used to fulfill the aim of the current study.

Setting: The Sim Man skills laboratory of the Faculty of Nursing-Menoufia University- Egypt

Sample: The sample size was estimated to detect the differences between nursing students and academic staff members regarding barriers and enablers for simulation based learning with a 95% level of confidence (error=5 %) and a study power of 80% (error=20%). Using the Epi-info computer software program the required sample size was 257 subjects. The sample consisted of:

a). A simple random sample of 240-second year undergraduate nursing students. b). A convenience sample of 17 Academic staff members from the Faculty of nursing Menoufia University were selected according to the following criteria; who finished Master or doctorate degrees and agreed to participate in the study to be included in the sample.

Instruments;

I. **A structured survey questionnaire;** it was designed by the researcher to include:

A). Socio-demographic data: Study subjects' sex.

B). A structured survey questionnaire: It was developed by the researcher and comprised of 20 items for describing point of views of both nursing students and academic staff members about barriers and enablers for simulation based learning. The questionnaire was formulated based on related studies and literature [24-27].

II. **A 3-points Likert scale:** was developed by the researcher after a thorough literature review and based on relevant studies [24-28] to identify barriers and enablers regarding simulation based learning. All selected questionnaire items were relevant to the two concepts; barriers, and enablers. It consisted of 25 items; 8 items for assessing barriers and 17 items for assessing enablers. Only those items relevant to our setting were included.

Scoring; each item in the scale was given a score of (1-3) where; 1= disagree, 2= neither agree nor disagree, and 3=agree**.** A total score was the summation of all items where; (1-24) means that SBL barriers more than enablers, (25-49) means that SBL barriers equal to enablers and (50-75) means that SBL enablers more than barriers.

Procedure for data collection:

• Study period: This study was conducted during the period starting from the beginning of September 2016 to the end of December 2016

• Approval: an official permission to carry out the study was obtained from the responsible authorities of the faculty of Nursing, Menoufia University.

• Instruments development: Validity; Instruments were reviewed and tested for validity by five medical-surgical nursing expert reviewers; modifications were done accordingly to ascertain relevance and completeness. Reliability: The internal consistency of the questionnaire was calculated using Cronbach's alpha coefficients. Test-retest was used. The Cronbach's alpha of the questionnaire was 0.92 indicated good reliability and for the scale it was 0.89 indicated good reliability

• Pilot study, a pilot study was conducted on 10% of the study sample to evaluate the developed tools for clarity, accuracy and concreteness before starting the actual data collection. The pilot sample was not included in the total sample of the actual research work to ensure stability of the answers. Based on the results of the pilot study modifications, and rearrangement of some questions were done. It also helped the researcher to estimate the time needed to fill in all data collection tools, which was ranging from 15 to 20 minutes for each student and faculty nursing staff member.

- Ethical consideration: protection of subjects' rights, oral consent was initially obtained from the subjects themselves who agreed to participate in the study. Each simulation session began with brief explanation from the researcher that simulation sessions were not graded and it is only a survey to help them in increasing their learning outcomes. All participants were notified that they have the right to refuse to participate in the study. In addition, anonymity and confidentiality of the gathered information were ensured.

Then data collection tools were distributed personally after securing an oral consent from the subjects themselves after completing the debriefing phase and at the end of the simulation session, each participant of both students and faculty staff groups was asked to complete it from his/her point of view describing what are the barriers and enablers regarding the simulation session. The final response rate was 100%.

3.1. Statistical Analysis: The collected data were coded, entered, tabulated and statistically analyzed using SPSS software (Statistical Package for Social Sciences, version 22, SPSS Inc. Chicago, IL, USA). Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means and standard deviations for quantitative variables. Correlation between variables was evaluated using Fisher exact test. Wilcoxon rank-sum tests and Chi-square tests were used to assess statistical significance. Statistical significance was considered at p-value <0.05. P value, highly significant difference if $P < 0.001$.

4. RESULTS

Despite that evidence demonstrating the various advantages of Simulation-based learning in nursing education; it is not widely integrated into nursing training programs worldwide especially in developing countries [7].

Table 1: Clarified that the majority of studied nursing students were females constituting (77.1%) of the total students, while all of studied academic staff members were female (100%). The difference was significant statistically (P=0.02).

Table 2: Indicated that there were statistically significant relationship between all study respondents' answers/perceptions, except for items (7,10,12) regarding barriers and enablers for simulation based learning according to their point of views. As (100%) of faculty staff members were agreed that SBL is a useful addition to learning how to deal with real patient, made the subject more interesting, helped student retain knowledge and provided a semi-realistic experience compared to (57.5%, 71.2%, 54.1% and70%) respectively for students.

Table 3: Illustrated that there were statistically significant relationship between faculty staff members and nursing students regarding enablers for simulation based learning. Moreover, the present study concluded that there was no statistically significance relationship between faculty staff members and nursing students regarding items (4,14&16) of SBL enablers scale. As (64.7%, 64.7% and 52.9) respectively of students were agreed that SBL allow exposure to semi-realistic experience, SBL give the ability to practice for many times and SBL make learning interesting for students compared to (65, 57.5% and 63.4%) respectively for faculty staff members.

Table 4: Demonstrated that there were statistically significant relationship between faculty staff members and nursing students regarding barriers for simulation based learning. The present study findings concluded that (50%, 38.7%, 10%, 79.6%, 40.4%, 63.4%, 68.7% and 35.5%) respectively of faculty staff, were agreed that there were eight barriers for SBL compared to (23.5%, 58.8%, 47.1%, 100%, 70.5%, 100%, 100% and 77.1%) respectively for students.

Table 5: Showed that there were no statistically significant relationship between faculty staff members and students regarding barriers' and enablers' scale total scores. As 12.9% of students were agreed that enablers are equal to barriers, while 100% of faculty staff compared to 87.1% of students were agreed that SBL enablers are more than barriers and 0% of both groups were agreed that SBL barriers are more than enablers.

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Fig1: Percentage distribution of barriers and enablers' scale total score according faculty staff members and students' point of views.

Table 6: Illustrated distribution of mean and standard deviation for the studied nursing students' gender according to their agreements/answers about barriers and enablers for simulation based learning. The present study demonstrated that there were no statistically significant differences between students' gender and all their answers/perceptions regarding simulation-based learning barriers and enablers' questionnaire except for the answer number six "SBL helped me to apply what I learned in clinical courses". As the male students' mean for this answer was (3.6±0.5) and females' was (3.5±0.7), while the total mean score was (3.5±0.6) and the p value was (0.03) indicating significance.

Table 7: Comparison between male and female students regarding SBL barriers and enablers scale total score. The current study illustrated that there were no statistically significant difference between students' gender and barriers and enablers scale total score as showed in the table number seven where X^2 was (2.0) and P was (0.15) indicating no significance. Moreover, the current study results revealed that less than one quarter of the students' group were males with (92.7%) of them agreed that enablers for simulation based learning are more than barriers, while more than three quarters of the students' group were females with (85.4%) of them agreed that enablers for simulation based learning are more than barriers.

Table 1: Gender percentage distribution of studied groups

Sex	Studied groups		Total	P value
	Faculty Staff	Students		
Male	0 0%	55 22.9%	55 21.4%	**Fisher exact test** = 0.02 **S***
Female	17 100%	185 77.1%	202 78.6%	
Total	17 100%	240 100%	257 100%	

S = Significant

Table 2: Relationship between study respondents' answers/perceptions regarding barriers and enablers for simulation based learning questionnaire according to their point of views

Barriers and enablers questionnaire items	Faculty staff (N=17)			Nursing students (N=240)			P value
	Disagree %	Neither agree nor disagree	Agree %	Disagree %	Neither agree nor disagree	Agree %	
1. Patient simulators are a useful addition to learning how to deal with real patient.	----	-----	100	6.2	36.3	57.5	0.000 HS
2. I would like more training with simulators.	----	-----	100	17.4	47.6	35	0.000HS
3. I'm familiar with simulator based learning concept.	35.3	64.7	-----	12.9	70	17.1	0.003 S
4. SBL simulators is a useful learning strategy.	----	17.6	82.4	- ---	41.3	58.7	0.006 S
5. SBL made the subject more interesting.	----	-----	100	-----	28.8	71.2	0.000 HS
6. SBL helped me to apply what I learned in clinical courses	----	11.8	88.2	----	38.4	61.6	0.001 S
7. SBL should be included in the learning courses frequently	----	17.6	82.4	----	22.1	77.9	0.17 NS
8. SBL helped student retain knowledge.	----	-----	100	---	45.9	54.1	0.000 HS
9. SBL improved my psychomotor skills.	----	47	53	----	29.6	70.4	0.02 S
10. SBL helped me in communication.	11.8	64.7	23.5	15	55.8	29.2	0.32 NS
11. SBL provided a semi-realistic experience.	----	-----	100	----	30	70	0.000 HS
12. SBL helped me in developing a clinical decision making While dealing with patient in an urgent clinical situation.	-----	52.9	47.1	10	58.7	31.3	0.09 NS
13. I felt comfortable with SBL environment.	47.1	47.1	5.8	20	30	50	0.000HS
14. I found it difficult to treat the mannequin as a real patient.	35.3	47	17.7	14.3	36.9	48.8	0.008 S
15. Instructor gave me the opportunity to practice at skills lab	----	29.4	70.6	27.9	34.6	37.5	0.001 S
16. I was given the opportunity to see the simulators.	47.1	41.1	11.8	27.5	33.7	38.8	0.04 S

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17. I'm satisfied with the role of the instructor and her level of knowledge and skills at the skills laboratory.	47.1	41.1	11.8	17.5	30.8	51.7	0.000HS
18. The time allocated for skills laboratory is appropriate.	-----	23.5	76.5	28.8	52.9	18.3	0.000HS
19. Cooperation between students is important for practicing in the skills laboratory.	52.9	47.1	-----	2.9	37.1	60	0.000HS
20. The facilities in the skills laboratory are adequate.	35.3	58.8	5.9	16.2	52.6	31.2	0.007 S

*P= Comparison between students 'and staff 'mean score for each barrier and enablers item. HS= High significant, S = Significant, NS = Not significant.

Table 3: Relationship between Faculty staff and Nursing students regarding enablers for simulation based learning.

Enablers for simulation based learning (SBL)	Faculty staff (N=17)			Nursing students (N=240)			P value
	Disagree %	Neither agree nor disagree	Agree %	Disagree %	Neither agree nor disagree	Agree %	
1. Allow Exposure to semi-realistic environment	----	----	100	6.7	86.6	6.7	0.000HS
2. Allow repetitive practice for skills on simulator.	----	11.8	88.2	27.5	33.7	38.8	0.000HS
3. Help students to become familiar with hospital environment.	----	----	100	20	30	50	0.000HS
4. SBL provide a semi-realistic experience.	17.6	17.7	64.7	10	25	65	0.07NS
5. Allow Safe and protected learning environment.	-----	11.8	88.2	5	56.3	38.7	0.000HS
6. SBL give a chance for students to learn from their mistakes.	----	----	100	11.3	58.7	30	0.000HS
7. SBL maintain patient's safety.	----	11.8	88.2	25	33.5	42.5	0.000 HS
8. Maintain non-threatening learning environment for students.		17.7	82.3	7.5	70	22.5	0.000HS
9. SBL improve the student's conceptual skills.	5.9	17.7	76.4	16.2	52.6	31.2	0.003 S
10. Improve interaction and group participation.	----	5.9	94.1	13.8	55	31.2	0.000HS
11. Enhance teamwork.	11.8	17.7	70.5	7.5	80.1	22.5	0.000HS
12. Enhance communication skills	----	----	100	12.4	63	24.6	0.000HS
13. SBL allow application of knowledge.	17.6	35.3	47.1	28.8	53.7	17.5	0.005 S
14. SBL give the ability to practice for many times.	17.6	17.7	64.7	6.2	36.3	57.5	0.61 NS
15. SBL enhance motivation in learning.	----	----	100	6.3	67.5	26.2	0.000HS
16. SBL make learning interesting for students.	23.5	23.6	52.9	5.8	30.8	63.4	0. 06 NS
17. SBL learning enhances student's confidence building while dealing with patient's related problems.	----	23.5	76.5	31.2	56.3	12.5	0.000HS

*P= Comparison between students 'and staff 'mean score for each barrier and enablers item. HS= High significant, S = Significant, NS = Not significant.

Table 4: Relationship between Faculty staff and Nursing students regarding barriers for simulation based learning.

Barriers for simulation based learning	Faculty staff (N=17)			Nursing students (N=240)			P value
	Disagree %	Neither agree nor disagree	Agree %	Disagree %	Neither agree nor disagree	Agree %	
1. Lack of time allowed to practice on simulator.	23.5	53	23.5	20	30	50	0.001HS
2. Shortage in the number of well trained faculty staf	35.3	5.9	58.8	27.5	33.8	38.7	0.04 S
3. Fear from complex technology	5.9	47	47.1	30.8	59.2	10	0.000HS
4. Insufficient numbers of simulators.	----	----	100	----	20.4	79.6	0.002 S

5.	Insufficient numbers of well-equipped laboratories	29.5	----	70.5	3.8	55.8	40.4	0.000HS
6.	large number of students which necessitates dividi them into many small groups.	----	----	100	0.8	35.8	63.4	0.000HS
7.	SBL puts extra workload on both faculty staff members and students	----	----	100	----	26.3	68.7	0.000 HS
8.	lack of technological and engineering support	12.8	10.1	77.1	51.3	13.2	35.5	0.000HS

*P= Comparison between students 'and staff 'mean score for each barrier and enablers item. HS= High significant, S = Significant, NS = Not significant.

Table 5: Relationship between faculty staff members and students' point of views regarding barriers' and enablers' scale total score.

Barriers and enablers' scale total score	Groups 1				Total		P value
	Faculty staff		Students				
SBL enablers are equal to barriers.	0	0 %	31	12.9%	31	12.1%	Fisher exact test=0.23 NS
SBL enablers are more than barriers	17	100%	209	87.1%	226	87.9%	
SBL barriers are more than enablers	0	0 %	0	0 %	0	0 %	
Total	**17**	**100%**	**240**	**100%**	**257**	**100%**	

Table (6): Distribution of mean and standard deviation for the studied nursing students' gender according to their agreements/answers about barriers and enablers for simulation based learning questionnaire (n = 240)

Barriers and enablers Questionnaire items	Male (N=55) Mean ±SD	Female (N=185) Mean ±SD	Total (N=240) Mean ±SD	t test	P value
1. Patient simulators are a useful addition to learning how with real patient.	3.2±0.9	3.3±0.9	3.3±0.9	1.2	0.30 NS
2. I would like more training with simulators.	2.7±1.1	2.8±1.1	2.8±0.5	1.3	0.29 NS
3. I'm familiar with simulator based learning concept.	2.6±1.0	2.4±0.8	2.4±0.9	0.73	0.4 NS
4. SBL is a useful learning strategy.	3.5±0.6	3.5±0.7	3.5±0.6	1.3	0.29 NS
5. SBL made the subject more interesting.	3.7±0.6	3.6±0.5	3.7±0.5	0.86	0.31 NS
6. SBL helped me to apply what I learned in clinical courses.	3.6±0.5	3.5±0.7	3.5±0.6	2.16	0.03 Sig.
7. SBL should be included in the learning courses frequently.	3.8±0.42	3.8±0.41	3.8±0.4	0.15	0.88 NS
8. SBL helped student retain knowledge.	3.3±0.7	3.4±0.7	3.4±0.7	0.53	0.75 NS
9. SBL improved my psychomotor skills.	3.7±0.4	3.7±0.3	3.7±0.4	0.10	0.9 NS
10. SBL helped me in communication.	2.9±0.9	2.8±1.1	2.8±1.0	1.14	0.25 NS
11. SBL provided a semi-realistic experience.	3.6±0.5	3.7±0.5	3.6±0.5	1.01	0.31 NS
12. SBL helped me in developing a clinical decision making while dealing with patient in an urgent clinical situation.	2.7±0.9	2.9±0.9	2.8±0.9	1.2	0.24 NS
13. I felt comfortable with SBL environment.	2.9±0.2	2.9±0.19	2.9±0.10	0.06	0.9 NS
14.I found it difficult to treat the mannequin as a real patient.	2.9±1.1	3.0±1.1	3.0±0.9	0.62	0.50 NS
15. Instructor gave me the opportunity to practice at skills lab.	2.6±1.2	2.9±1.1	2.8±0.7	1.3	0.17 NS
16. I was given the opportunity to see and practice on simulators.	2.6±1.2	2.8±1.1	2.8±1.1	0.9	0.35 NS
17. I'm satisfied with the role of the instructor and her level of knowledge and skills at the skills laboratory.	2.9±1.1	3.1±1.1	3.0±0.7	0.76	0.4 NS
18. The time allocated for skills laboratory is appropriate.	2.3±1.0	2.3±1.1	2.2±0.8	0.52	0.60 NS
19. Cooperation between students is important for practicing in the skills laboratory.	3.3±0.8	3.3±0.9	3.3±0.7	0.04	0.96 NS
20. The facilities in the skills laboratory are adequate.	2.8±1.0	2.5±1.0	2.7±0.7	1.6	0.11 NS

NS= not significant

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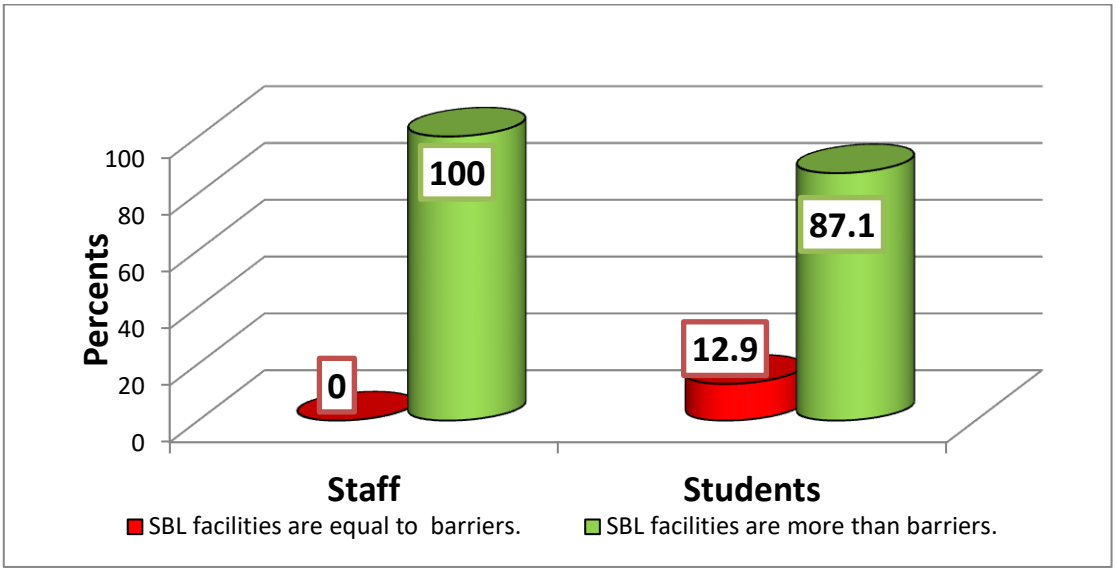

Fig 1: Percentage distribution of barriers and enablers' scale total score according faculty staff members' and sudents' point of views.

Table 7: Comparison between male and female students regarding SBL barriers and enablers scale total score.

Sex	Groups of total score				Total		P value
	SBL enablers are equal to barriers.		SBL enablers are more than barriers.				
male	4	7.3%	51	92.7%	55	100.0%	X^2=2.0, P= 0.15 NS
female	27	14.6%	158	85.4%	185	100.0%	
Total	31	12.9%	209	87.1%	240	100.0%	

5. DISCUSSION

Despite that health professional education, continue to improve the nursing teaching and learning process but learning barriers still challenging. Therefore, it was essential to develop strategies and implement researches for identifying and understanding the nature of these barriers which obstacle the use of simulation in nursing curricula and to be able for future solving or at least dealing with these obstacles [27].

Answering the first Research question, Is there any significant relationship between the respondents' perceptions/ agreements regarding barriers and enablers facing the second year undergraduate nursing students during simulation-based education according to their point of views? The current study indicated that there were statistically significant relationship between all study respondents' answers/ perceptions, (except for items 7,10&12) regarding barriers and enablers for simulation-based learning (SBL) according to their point of views. As all faculty staff group compared to more than half of students' group were agreed that SBL is a useful addition to learning how to deal with real patient, helped student retain knowledge moreover, all faculty staff members compared to more than two thirds of students were agreed that SBL made the subject more interesting, and provided a semi-realistic experience.

The current study results were in congruence with the results of [28] who stated, "Practicing skills in a holistic and safe setting like that in simulation environment with the help of other peers as team members was seen as highly beneficial". Moreover, the present study results were in line with [29] who concluded, "Debriefing with video feedback was perceived to enhance participants' reflection at a number of levels with remarkable benefits to learning outcomes".

Furthermore, this study results were in consistent with findings of [30] who demonstrated that "repeated practice of clinical skills over the three simulation phases improve ratings of performance while enhancing application of theoretical knowledge and enabling students to identify competency gaps to learn from errors".

Likewise, these findings were consistent with findings of [31] who described "learning from errors as a powerful educational experience".

This may be attributed to the uncertainty about how far role-play should extend when acting out a certain simulation scenario. Achieving a suitable level of believability presents a design dilemma in simulation education, for students may not be able to transcend all aspects to perceive role-play as being real while, the simulation environment, engineering and psychological realism, may be considered the great barriers for the participant's perception of the simulation realism.

Answering the second Research question, Is there any significant relationship between faculty staff members and nursing students regarding enablers for simulation-based learning? The current study illustrated that there were statistically significant relationship between faculty staff members and nursing students regarding all enablers scale items for simulation based learning, (except for items 4, 14 & 16).

Moreover, the present study concluded that there was no statistically significance relationship between faculty staff members and nursing students regarding items (4, 14 & 16) of SBL enablers scale. As about two thirds of both students and faculty staff were agreed that SBL allow exposure to semi-realistic experience.

Furthermore, the current study revealed that about two thirds of students' group compared to more than half of faculty staff group were agreed that SBL give the ability to practice for many times and alternatively, more than half of students and about two thirds of faculty staff were agreed that SBL make learning interesting for students.

These findings were congruent with that of [32] who stated, "Subjects indicated that they felt that the acquisition of key cognitive, technical, and behavioral skills and transfer of those skills to the real medical domain was better achieved during simulation-based training".

The current study results were in correspondence with the findings of [33] who validated, "the continued use of traditional laboratory methods alone for teaching including demonstration and return demonstration were no more been supported by sufficient evidence to be an effective approach for teaching students the nursing skills".

Furthermore, the present study findings were constant with that of [34] who incorporated, "the use of interactive and innovative modalities for teaching the current generation of technologically inclined students is the best approach to enhance knowledge development in nursing education and to give a reliable way for measuring student self-confidence and competence".

Likewise, these findings were consistent with findings of [35] who stated, "The key aspects of simulation education are the ability to repeat practice to consolidate learning and develop competence through using instructor feedback and video debriefing".

Moreover, the current study findings were in line with findings of [36,37] they demonstrated that "simulation is an effective method of learning because it implicates four key facets of nursing education and allow the development of educational competence in clinical reasoning as students learn to apply knowledge and skills during the analysis of current evidence to make a clinical judgment".

These agreements between the present study findings and others' may be attributed to the great value and advantages of simulation in nursing education as it allow developing technical proficiency through practice of psychomotor skills and repetition; assistance of experts which is tailored to students' needs; situated learning within context; and incorporation of the affective (emotional) component of learning.

Answering the third Research question is there any significant relationship between faculty staff members and nursing students regarding barriers for simulation based learning? The current study clarified that there were statistically significant relationship between faculty staff members and nursing students regarding barriers for simulation based learning.

The present study findings concluded eight barriers for SBL these barriers were; "lack of time allowed for practicing on simulator, shortage in the number of well trained faculty staff, fear from complex technology, insufficient number of simulators and well-equipped laboratories, large number of students, extra workload on both faculty staff members and students and lack of technological and engineering support".

These results were in the same sequence with the results of [38-39] they stated, "A number of barriers for simulation-based learning were identified by Participants including high levels of stress, complex simulation equipment and lack of administrative support for workload reduction and faculty training".

Furthermore, the present study results were in line with the results of [31] who studied "Assessing Learning Barriers among Dental and Nursing Undergraduates: A Qualitative Study, Students' Perspective" and stated that the awareness of the occurrence of learning barriers and how they interfere the learning process will provide a better understanding of the learners' experience for personal growth and reflection".

In addition, the present study results were consistent with the results of [40] who stated, "Learning barriers do not appear abruptly but it has roots that may start affecting even from early stages and continue throughout the educational processes".

Moreover, the current study results were in the same sequence with [41] who said, "There are a number of barriers to simulation in nursing were identified including lack of time for simulation scenario planning and preparation, lack of faculty training to correctly utilize evidence- based best practices and stress issues".

This can be explained that in order to fully understand and to be able to solve these problems or situations experienced by learners or faculty members as they have an integral role in the education system and to determine any existing barriers to learning that may adversely influence the learner and the whole learning process.

Answering the fourth Research question, is there any significant relationship between faculty staff and nursing students regarding barriers and enablers scale total score for simulation- based learning? The current study showed that there were no statistically significant relationship between faculty staff members and nursing students regarding barriers and enablers scale total score for simulation- based learning. As minority of students' group were agreed that enablers are equal to barriers, while all the faculty staff group compared to majority of students were agreed that SBL enablers are more than barriers and none of both groups was agreed that SBL barriers are more than enablers.

The present study results were consistent with the results of [42] who stated, "Barriers as well as enablers to learning were identified by participants in team-based simulation education".

Moreover, the current study results were in the same sequence with [43] who said, " Simulation-assisted teaching has been a positive experience for majority of nursing students, but still further efforts are needed in developing quality simulation-based course curriculum as well as planning and structuring its teaching process".

Likewise, these findings were consistent with findings of [44,45] they stated, "The perfect SBL approach requires close collaboration between faculty and students". This can be assumed that students' perception for the simulation realism is influenced by the fidelity, team working, and experience provided through repeated practice otherwise it may not be perceived well in addition, high stress levels associated with simulation may reduce the effectiveness of teaching and learning.

Answering the fifth Research question, is there any significant relationship between students' sociodemographic characteristics and their answers/perceptions for simulation-based learning barriers and enablers questionnaire? The present study demonstrated that there were no statistically significant difference between students' gender and all their answers/perceptions for simulation-based learning barriers and enablers' questionnaire as illustrated in the table number six except for answer number six "SBL helped me to apply what I learned in clinical courses".

As the male students' mean for this answer was (3.6±0.5) and females' was (3.5±0.7), while the total mean score was (3.5±0.6) and the p value was (0.03) indicating significance.

The present study results were supported by the results of [46] who studied, "Simulation based learning in Australian midwifery curricula: results of a national electronic survey and stated that participants' sociodemographic characteristics were likely to be less effective in their answers".

Moreover, the current study results were in the same sequence with [47] who studied, "Is simulation a substitute for real life clinical experience in midwifery? A qualitative examination of perceptions of educational leaders and concluded that there were no statistically significant difference between participants' sociodemographic characteristics and their perceptions".

Likewise, these findings were congruent with findings of [48] who studied, "Using Low-fidelity simulation with nursing students in a baccalaureate nursing program and stated that nursing students' agreements were not affected by their sociodemographic characteristics".

Moreover, [49] who studied, "Perceptions of simulation-assisted teaching among baccalaureate nursing students in Chinese context: Benefits, process and barriers" agreed with the current study results and demonstrated that students' age and sex had no effect on their perceptions ".

At the same time, the current study findings were on contrary with the findings of [50] who studied, "Technology-enhanced simulation for health professions education: a systematic review and meta-analysis" and ascertained, "there was a positive statistical relation between participants' sociodemographic characteristics and their judgments". In addition, [51] who studied, "A review of simulation based inter-professional education" was in contrast with the present study results as they suggested, "The existing culture and sociodemographic threatens affects the acceptance of simulation-based education and that trainees of younger age experienced high-fidelity simulation than older ones and they may be more amenable for continuing education when they become staff. They may also encourage others to participate if their experiences in simulation are positive".

Finally, these variations between results can be attributed to the methodological, cultural background or geographical differences between the present study and other studies.

Answering the sixth Research question, is there any significant relationship between students' sociodemographic characteristics and barriers and enablers scale total score? The current study illustrated that there were no statistically significant difference between students' gender and barriers and enablers scale total score as showed in the table number seven where X^2 was (2.0) and P was (0.15) indicating no significance.

Moreover, the current study results revealed that less than one quarter of the students' group were males with majority of them agreed that enablers for simulation based learning are more than barriers, while more than three quarters of the students' group were females with majority of them agreed that enablers for simulation based learning are more than barriers.

The present study findings were in line with that of [52] who studied "Barriers to use of simulation-based education and stated that although there was no significance, on average trainees perceived more barriers than staff". These results were also supported by the results of [53] who stated, "The awareness of trainees for learning barriers even without knowing their demographics' is very important for enhancing the competency of learning process ".

On contrary these results were in dissimilarity with that of [54] who studied Student Engagement in Extracurricular Activities and Academic Performance: Exploring Gender Differences and demonstrated that there were highly significance between participants' sociodemographic characteristics and barriers and enablers agreements score". This variance may be explained by the methodological differences found in the tools used for assessing participants' perception for barriers and enablers for simulation.

6. CONCLUSIONS

Based on the findings of this study, **seven barriers** for simulation-based learning were identified, including "Lack of time", "Fear from complex technology", "Insufficient numbers of simulators", "Insufficient numbers of well-equipped laboratories", "large number of students", "stress and extra workload" and "lack of technological and engineering support".

Moreover, **fourteen enablers** were identified, including "Exposure to semi-realistic environment", "Repetitive practice for skills", "Help students to become familiar with hospital environment", "Allow safe and protected learning environment", "Give a chance for students to learn from their mistakes", "Maintain patient's safety", "Maintain non-threatening learning environment for students", "Improve the student's conceptual skills", "Improve interaction and group participation", "Enhance teamwork", "Enhance communication skills", "Allow application of knowledge", "Enhance motivation in learning" and "Enhances student's confidence building".

The concluded barriers to simulation relate mainly to the complex technologies inherent in high fidelity simulators (HPSMs). Applying strategic approaches that support and provide dedicated technological support may overcome most of these barriers.

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7. RECOMMENDATIONS

- Frequent simulation-training programs for academic staff to get the best simulation practice.
- Allow simulators' technological support on a periodical basis.
- Identify the challenges inherent in simulation-based learning to enhance the learning process and provide ultimately competent graduates.
- Support a sound basis for building the scientific evidence necessary to shape and support the use of simulation in nursing education, with careful consideration to risk sensitization and outcome measurement.
- Initiate a link between students and academic researchers for adoption of research findings.
- Replication of the study with a larger sample of students from different program levels including baccalaureate and associate-degree settings.

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