The Bioscan AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
20(3): S.I (3), 736-742, 2025 www.thebioscan.com

# "Nursing Beyond Classrooms: Clinical Simulation Insights"

**Ms. Ritika[1], Ms. Shephali[2], Ms. Anjali Chauhan[3], Ms. Nikita[4], Mr. Naveen[5]**

[1-4] B.sc Nursing student, SGT University Gurugram, Haryana, India

[5]Assistant Professor, Community Health Nursing Department, SGT University, Gurugram, Haryana, India

**Corresponding Author:** Mr. Naveen[5]

**DOI: 10.63001/tbs.2025.v20.i03.S.I(3).pp736-742**

**Received on:**

**06-07-2025**

**Accepted on:**

**03-08-2025**

**Published on:**

**05-09-2025**

## ABSTRACT

**Introduction:**

The goal of simulation-based education is to "replace or magnify real experience with guided encounters." A training method called educational simulation involves putting participants in situations where they must actively solve problems in order to assess their knowledge and proficiency levels. Through a realistic, immersive experience, simulation-based learning offers students real-world insights into a subject.

**Objective:**

To analyze the knowledge and satisfaction level of Simulation based learning.

**Materials and Methods:**

The descriptive study includes 100 students of BSc nursing from SGT University. The sample were selected using random sampling technique .Pre Test and Post Test was done to know the effectiveness of clinical simulation. Data was collected using structured questionnaire that covered demographic factor such as: age in years, area of residence, qualification, previous knowledge regarding simulation based learning, experience of simulation, knowledge regarding clinical simulation and satisfaction among students regarding clinical simulation.

**Results:**

Among nursing students, the majority of participants in the pre-test – 54 (54%) – were developing 37 (37%) were novices, and 9 (9%) were experts in clinical simulation. The majority of participants in the post-test – 59(59%) – were proficient, 30(30%) were developing and 11(11%) were expert in clinical simulation among nursing students. The respondents distribution based on how satisfied nursing students are with clinical simulation. Of the participants in the pre-test, 44(44%) were satisfied and 56(56%) were not. Four (4%) participants were not pleased with the post-test, whereas the majority of 96(96%) people were.

**Conclusion:**

Students reported high levels of satisfaction with the simulation experience, indicating its effectiveness in complementing traditional teaching methods. Overall, simulation serves as a critical bridge between theory and practice, supporting the development of competent, confident and patient – centered nursing professionals who are better prepared to contribute to quality healthcare and improved patient outcomes.

## INTRODUCTION

"Educational simulation is a training method that assesses the knowledge and skill levels of participants by presenting them with scenarios in which they must actively resolve challenges. To ensure a secure environment for hands- on learning, the instructor establishes the norms. It is an indispensable teaching component in professional health training.Clinical simulation is a modern and increasingly essential teaching-learning strategy in nursing education. With rapid technological advancements and limited real-patient exposure due to increasing student strength, patient safety concerns, and medico-legal issues, simulation-based learning has emerged as a safe and effective alternative to traditional clinical practice. Simulation allows nursing students to practice clinical decision-making, psychomotor skills, and communication in a controlled, risk-free environment, thereby enhancing their competence and confidence.

In institutions like SGT University, where the Faculty of Nursing is dedicated to providing high-quality education through advanced learning resources, simulation-based training is frequently incorporated into the curriculum. However, the actual **knowledge level** of students regarding simulation and their **satisfaction** with such methods remains underexplored. Understanding students' perceptions and experiences with clinical simulation is critical to:

1. Evaluate the effectiveness of simulation-based learning.
2. Identify any gaps in student awareness or preparedness.

3. Modify or improve simulation strategies for better learning outcomes.

4. Ensure a student-centric approach in clinical skill development.

Simulation-based education is a type of instruction or training that seeks to "replace or magnify real experience with guided encounters." Educational simulation is a training method that assesses the knowledge and skill levels of participants by presenting them with scenarios in which they must actively resolve challenges. To ensure a secure environment for hands-on learning, the instructor establishes the norms. It is an indispensable teaching component in professional health training. A potent teaching tool with significant, albeit unrealized, promise is clinical simulation. By immersing students in realistic digital environments, this technology help them acquire the knowledge and abilities they will need for their future employment. Clinical simulation is an experience that is somewhat immersive and accurately recreates reality on a computer screen. Through a realistic, immersive experience, simulation-based learning offers students real-world insights into a subject. A regulated, secure, and safe environment is used for the active teaching and learning process known as simulation. The basic purpose of simulation is to shed light on the underlying mechanics that control the behavior of a system. It is possible to anticipate (predict) a system's future behavior utilizing simulation, and you can use it to determine how you can affect that behavior in the future. One of the biggest problems with nursing education is the incompatibility of theory and practice. Understanding nursing terms and concepts hinders a student's capacity to integrate professionally, and the gap between theory and practice makes learning more challenging. This is achieved by possessing a comprehensive understanding of health care science, where nursing theory and practical skills coexist. Students most strongly agreed with the statement, "Simulation helped in better understanding the concepts in the clinical setting," as demonstrated by their mean score of 3.0. The statement with the lowest mean score, 2.74, was "simulation was realistic and students experienced nervousness during their simulation sessions." Therefore, this study is vital to assess both the knowledge and satisfaction of B.Sc. Nursing students regarding simulation experiences and to inform evidence-based improvements in nursing.

**PROBLEM STATEMENT**

A descriptive study to analyze the knowledge and satisfaction of clinical simulation among B.sc nursing students at SGT University, Gurugram, Haryana.

**PURPOSE FOR THE STUDY**

The purpose of this study is to assess and analyze the level of knowledge and satisfaction regarding clinical simulation among B.Sc. Nursing students at SGT University, Gurugram, and Haryana.

**OBJECTIVES OF THE STUDY**

1. To assess the knowledge regarding clinical simulation among nursing students.
2. To assess the Satisfaction level regarding clinical simulation among nursing students.
3. To find out the effectiveness of clinical simulation on knowledge and satisfaction in clinical simulation among nursing students.
4. To determine the relationship between knowledge and satisfaction level regarding clinical simulation among nursing students.
5. To find out the association between pre-test knowledge level regarding clinical simulation among nursing student with selected demographic variable.
6. To find out the association between pre-test satisfaction level regarding clinical simulation among nursing student with selected demographic variable.

**HYPOTHESIS**

H1: The knowledge and satisfaction scores of nursing students regarding clinical stimulation after significantly between pre - test and post -test.

H2: There is a significant correlation between knowledge and satisfaction in clinical simulation among nursing students.

H3: Pre-test clinical simulation knowledge among nursing students is significantly correlated with a few chosen demographic variables.

H4: Nursing students pre- test satisfaction with clinical stimulation and a few chosen demographic variables are significantly correlated.

**ASSUMPTIONS**

- B.Sc. Nursing students have been exposed to clinical simulation as part of their academic and practical training at SGT University.
- Students are capable of accurately expressing their level of knowledge and satisfaction through the structured questionnaire and rating scale provided.
- Clinical simulation is an integral component of nursing education that contributes to skill development, decision-making, and confidence among nursing students.
- Students' knowledge and satisfaction levels may vary depending on factors such as year of study, exposure frequency, quality of simulation experiences, and individual learning preferences.
- The data collected through self-reported tools is reliable, assuming that participants respond honestly and to the best of their understanding.

**Material and Methods**

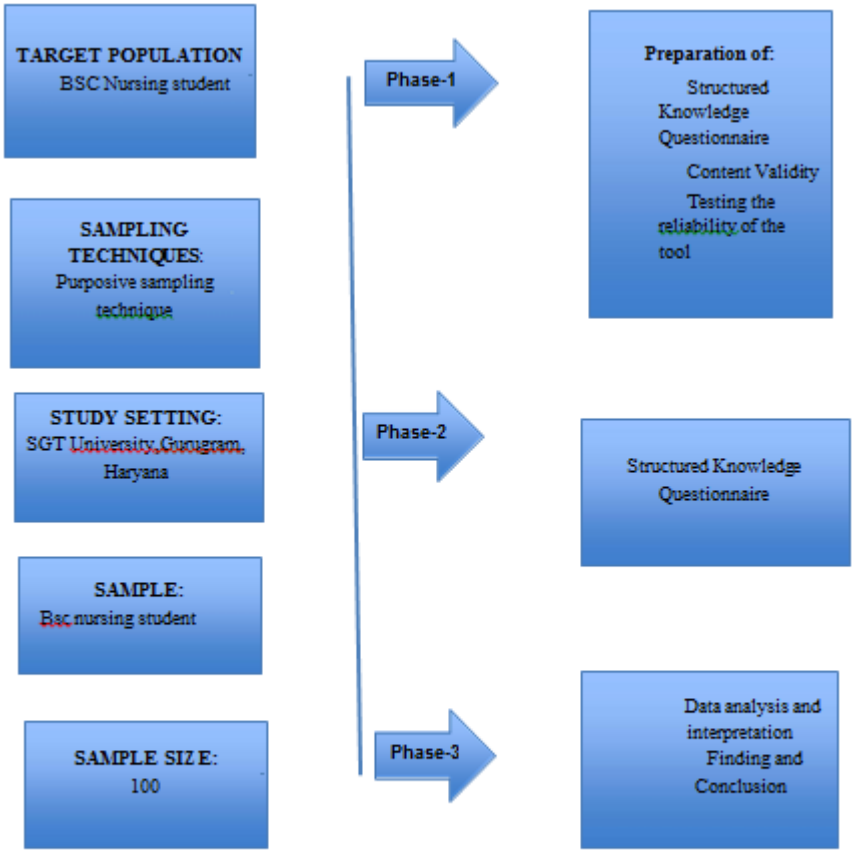




**Fig 3.2: Schematic Representation of the research design of the study**

**RESEARCH SETTING**

The primary study was conducted at SGT University in Gurugram, Haryana, in a few different locations. When selecting the students, the feasibility of the study, sample availability, and geographic proximity were taken into account. For the primary study, we chose a different faculty member.

**POPULATION**

The population that the researcher discovered in the study region is listed here. The study's accessible population comprised all SGT students who were available during the data collection time.

**Sample and sample size:**

A sample is a unit of analysis that is typical of the target population that researchers will be working with in their study. A sample is a portion of the population that the researchers have chosen to include in study.

In this study sample is all the BSc Nursing SGT students at the SGT University campus in different batch like BSc Nursing 1st year students, BSc Nursing 2nd year students, BSc Nursing 3rd year students, BSc Nursing 4th year students

**Sample Size:** The sample size of this study was **100 students** from Faculty of nursing of SGT University to analyze the knowledge and satisfaction of clinical simulation among undergraduate students of Nursing. The different batch were included in the study such as BSc Nursing 1st year students ,BSc Nursing 2nd year students ,BSc Nursing 3rd year students, BSc Nursing 4th year students etc. and who meet the study's inclusion criteria and are available at the time of data collection.

**Sampling technique:** A subset of a person (a sample) selected at random from larger set (a population) is known as a random sample in statistics. Everybody was selected at randomly. A Google Form was utilized to collect data using a random sampling technique using the Knowledge Assessment Tool and Satisfaction Assessment Tool.

**Criteria of Test Determination:**

**Inclusion criteria:**

- Students who were present at the time of data collection.
- Students who were willing to participate.

**Exclusion criteria:**

- Students who were not present at the time of collection.
- Students who were not willing to participate.

**Description of tool:**

The most crucial and significant aspect of any analysis is the collection of necessary information since it provides the study with the data it requires. The instrument used in this study is a structured questionnaire with the following sections:

Part- A: This section consist of 6 items for obtaining information on demographic variables: age in years, area of residence, qualification, previous knowledge regarding simulation based learning, experience of simulation.

Part B: This section consist of 10 questions for assessing the level of knowledge BSc Nursing students regarding clinical simulation. Each question consist of four options and select one option out of four according to your experiences.

Part C: This section consist of 10 questions for assessing the level of satisfaction among BSc Nursing students regarding clinical simulation. Each question consist of five options and select one option out of five according to your experiences. The scoring is:

Strongly Agree = 4, Agree = 3, Neutral= 2, Disagree = 1, Strongly Disagree = 0

**Table -Distribution of Respondent according to knowledge and satisfaction regarding clinical simulation among nursing students.**

(N=100)

| Group | Test | Max Score | Mean | Mean % | Median | SD |
|---|---|---|---|---|---|---|
| Knowledge Score | Pretest | 10 | 3.6 | 36% | 4 | 1.47 |
| | posttest | 10 | 6.49 | 64.9% | 6.5 | 1.35 |
| Satisfaction Score | Pretest | 50 | 29.85 | 59.7% | 30 | 4.09 |
| | posttest | 50 | 39.83 | 79.66% | 40 | 3.66 |

Table- Depict the distribution of respondent according to knowledge and satisfaction regarding clinical simulation among nursing students. In knowledge area pre-test means score in 3.6 with mean % 36% and SD 1.47 and in posttest mean score in 6.49 with mean % 6.49% and SD 1.35. Similarly in satisfaction area pre-test mean score in 29.85 with mean % 59.7% and SD 4.09 and in posttest mean score in 39.83 with mean % 79.66% and SD 3.66.

**Table -Distribution of respondent on knowledge level regarding clinical simulation among nursing students.**

(N=100)

| Sl. No | Knowledge level | Score | Pre-test | | Post-Test | |
|---|---|---|---|---|---|---|
| | | | F | % | F | % |
| 1. | Novice | 0 – 2 | 37 | 37% | 0 | 0% |
| 2. | Developing | 3 – 5 | 54 | 54% | 30 | 30% |
| 3. | Proficient | 6 – 8 | 9 | 9% | 59 | 59% |
| 4. | Expert | 9 - 10 | 0 | 0% | 11 | 11% |
| **Total** | | | **100** | **100%** | **100** | **100%** |

Table- Shows the distribution of respondent according to knowledge Level regarding clinical simulation among nursing students. In pre-test majority 54 (54%) participants were developing, 37 (37%) were Novice and 9 (9%) participants were proficient regarding clinical simulation among nursing students. In post-test majority 59 (59%) participants were proficient, 30 (30%) were Developing and 11 (11%) participants were Expert regarding clinical simulation among nursing students.

**Table -Distribution of respondent on satisfaction level regarding clinical simulation among nursing students**

(N=100)

| Sl. No | Satisfaction level | Score | Pre-test | | Post-Test | |
|---|---|---|---|---|---|---|
| | | | F | % | F | % |
| 1. | Not satisfied | 10 to 30 | 56 | 56.0% | 4 | 4.0% |
| 2. | Satisfied | 30 to 50 | 44 | 44.0% | 96 | 96.0% |
| **Total** | | | **100** | **100%** | **100** | **100%** |

Table- Shows the distribution of respondent according to satisfaction level regarding clinical simulation among nursing students. In pre-test majority 56 (56%) participants were not satisfied and 44 (44%) participants were satisfied. In post-test majority 96 (96%) participants were satisfied and 4 (4%) participants were not satisfied.

**Table : Distribution of respondent on effectiveness of clinical simulation on knowledge and satisfaction in clinical simulation among nursing students**

(N=100)

| Aspect | Group | Mean | Mean difference | Standard deviation | 't 'value | df | p-value |
|---|---|---|---|---|---|---|---|
| Knowledge | Pre-test | 3.6 | 2.89 | 1.47 | 33.475 | 99 | 0.000 |
| | Post-test | 6.49 | | 1.35 | | | |
| satisfaction | Pre-test | 29.85 | 9.98 | 4.09 | 24.013 | 99 | 0.000 |
| | Post-test | 39.83 | | 3.66 | | | |

Table Represents the Effectiveness of clinical simulation on knowledge and satisfaction in clinical simulation among nursing students. The knowledge mean difference between pre-test and post-test is 2.89. The't'- value is 33.475, df=99 with the p-value 0.000. The satisfaction mean difference between pre-test and post-test is 9.98. The't'- value is 24.013, df=99 with the p-value 0.000. Which indicate there is a difference between pre-test and posttest score and clinical simulation training was effective? Hence, the research hypothesis $H_1$ is accepted.

**Table : Finding related to Correlation between knowledge and satisfaction in clinical simulation among nursing students.**

(N=100)

| Group | Category | R | INFERENCE |
|---|---|---|---|
| Pretest | Knowledge | 0.287 | Weak positive correlation |
| | Satisfaction | | |
| Posttest | Knowledge | 0.596 | Moderate positive correlation |
| | Satisfaction | | |

Table: -The correlation between the pre-test score of knowledge and satisfaction is 0.287 which indicate weak positive correlation similarly in post-test score of knowledge and satisfaction is 0.596 which indicate moderate positive correlation It is computed by Raw Score method. Therefore, research Hypothesis $H_2$ is accepted and there is a significant relationship between knowledge and satisfaction score.

**Table- Association between pre-test knowledge level regarding clinical simulation among nursing student with selected demographic variable. (N=100)**

| Variable | Novice | Developing | Proficient | Df | Chi-square value | P value | Inference |
|---|---|---|---|---|---|---|---|
| **Age in year** | | | | | | | |
| 17 to 18 year | 6 | 8 | 0 | 6 | 4.015 | 0.675 | NS |
| 19 to 20 year | 24 | 29 | 6 | | | | |
| 21-22 year | 6 | 14 | 2 | | | | |
| 23 above year | 1 | 3 | 1 | | | | |
| **Total** | **37** | **54** | **9** | | | | |
| **Gender** | | | | | | | |
| Female | 27 | 46 | 5 | 2 | 4.812 | 0.09 | NS |
| Male | 10 | 8 | 4 | | | | |
| **Total** | **37** | **54** | **9** | | | | |
| **Residence** | | | | | | | |
| Rural | 14 | 20 | 3 | 2 | 0.063 | 0.969 | NS |
| Urban | 23 | 34 | 6 | | | | |
| **Total** | **37** | **54** | **9** | | | | |
| **Qualification** | | | | | | | |
| B.Sc 1st year | 8 | 5 | 1 | 6 | 4.374 | 0.626 | NS |
| B.Sc 2nd year | 18 | 32 | 6 | | | | |
| B.Sc 3rd year | 6 | 6 | 1 | | | | |
| B.Sc 4th year | 5 | 11 | 1 | | | | |
| **Total** | **37** | **54** | **9** | | | | |
| **Previous knowledge regarding simulation-based learning** | | | | | | | |
| No | 10 | 9 | 0 | 2 | 3.851 | 0.146 | NS |
| Yes | 27 | 45 | 9 | | | | |
| **Total** | **37** | **54** | **9** | | | | |
| **Experience of simulation** | | | | | | | |
| 1 year | 19 | 30 | 5 | 6 | 4.664 | 0.588 | NS |
| 2 year | 8 | 11 | 4 | | | | |
| 3 year | 6 | 9 | 0 | | | | |
| > 3 year | 4 | 4 | 0 | | | | |
| **Total** | **37** | **54** | **9** | | | | |

**NS = not significant 0.05 level of significant**

The table shows chi – square value for Age, Gender, area of residence, qualification, Previous knowledge regarding simulation-based learning, experience of simulation. The obtained p value for these variables is more than p<0.05 value, which indicates that there is no significant association. Hence, the research hypothesis **$H_3$ is rejected.**

**Table - Association between pre-test satisfaction level regarding clinical simulation among nursing student with selected demographic variable. (N=100)**

| Variable | Not satisfied | Satisfied | Df | Chi-square value | P value | Inference |
|---|---|---|---|---|---|---|
| **Age in year** | | | | | | |
| 17 to 18 year | 5 | 9 | 3 | 3.643 | 0.303 | NS |
| 19 to 20 year | 35 | 24 | | | | |
| 21-22 yr | 14 | 8 | | | | |
| 23 above year | 2 | 3 | | | | |
| **Total** | **56** | **44** | | | | |
| **Gender** | | | | | | |
| Female | 43 | 35 | 1 | 0.109 | 0.741 | NS |
| Male | 13 | 9 | | | | |
| **Total** | **56** | **44** | | | | |
| **Residence** | | | | | | |
| Rural | 20 | 17 | 1 | 0.090 | 0.764 | NS |
| Urban | 36 | 27 | | | | |
| **Total** | **56** | **44** | | | | |
| **Any workshop/Seminar** | | | | | | |
| B.Sc 1st year | 6 | 8 | 3 | 1.576 | 0.665 | NS |
| B.Sc 2nd year | 34 | 22 | | | | |
| B.Sc 3rd year | 7 | 6 | | | | |
| B.Sc 4th year | 9 | 8 | | | | |
| **Total** | **56** | **44** | | | | |
| **Previous knowledge regarding simulation-based learning** | | | | | | |
| No | 13 | 6 | 1 | 1.469 | 0.226 | NS |
| Yes | 43 | 38 | | | | |
| **Total** | **56** | **44** | | | | |
| **Experience of simulation** | | | | | | |
| 1 year | 30 | 24 | 3 | 0.187 | 0.980 | NS |
| 2 year | 13 | 10 | | | | |
| 3 year | 8 | 7 | | | | |
| > 3 year | 5 | 3 | | | | |
| **Total** | **56** | **44** | | | | |

NS = not significant 0.05 level of significant

The table shows chi – square value for Age, Gender, area of residence, qualification, Previous knowledge regarding simulation-based learning, experience of simulation. The obtained p value for these variables is more than p<0.05 value,

which indicates that there is no significant association. Hence, the research hypothesis **$H_4$ is rejected.**

**Comparative Analysis with Review of Literature (Based on Objectives)**

**Objective 1: To assess the knowledge regarding clinical simulation among nursing students**

| Study | Key Findings | Comparison with our Study |
|---|---|---|
| 1. **Alharbi et al. (2024)** (BMC Med Educ) | Simulation significantly enhanced nursing students' theoretical knowledge and clinical decision-making skills. | Our study showed a clear improvement in post-test knowledge (from 36% to 64.9%). Similar effectiveness is seen. |
| 2. **Tong et al. (2024)** (BMC Nursing) | High-fidelity simulation increased knowledge, caring ability, and collaboration. | Supports finding where simulation advanced students from novice to proficient/expert. |
| 3. **Kim et al. (2023)** | Students exposed to repeated simulation sessions had significantly better retention of clinical knowledge. | Reinforces outcome where exposure improved knowledge scores significantly. |

**Objective 2: To assess the satisfaction level regarding clinical simulation among nursing students**

| Study | Key Findings | Comparison with our Study |
|---|---|---|
| 4. **Choi et al. (2023)** (BMC Nursing) | Virtual simulation improved student satisfaction, especially when paired with case seminars and feedback. | Similar to our result where satisfaction rose from 59.7% to 79.66% after intervention. |
| 5. **Alrashidi et al. (2023)** (BMC Nursing) | Students reported high satisfaction due to improved realism and confidence gained in simulations. | Supports our findings that simulation significantly increased satisfaction (96% satisfaction post-test). |
| 6. **Wang et al. (2022)** | Satisfaction was highest when simulation involved realistic scenarios and immediate feedback. | our study mirrors this, with debriefing and structured content likely influencing high post-test satisfaction. |

**Objective 3: To find out the effectiveness of clinical simulation on knowledge and satisfaction**

| Study | Key Findings | Comparison with our Study |
|---|---|---|
| 7.**Cant & Cooper (2017)** | Simulation improved learning outcomes more than traditional classroom methods. | our t-test findings ($p < 0.000$) confirmed significant effectiveness on both knowledge and satisfaction. |
| 8. **Aebersold et al. (2021)** | Simulation boosts competence, critical thinking, and learner engagement. | Matches our result where post-test levels shifted dramatically in both knowledge and satisfaction categories. |

**Objective 4: To determine the relationship between knowledge and satisfaction**

| Study | Key Findings | Comparison with our Study |
|---|---|---|
| 9. **Yuan et al. (2019)** | Students with better simulation understanding reported greater satisfaction and engagement. | Supports our finding of moderate positive correlation ($r = 0.596$ post-test) between knowledge and satisfaction. |
| 10. **Jahanpour et al. (2016)** | Positive correlation between students' confidence in knowledge and their satisfaction with simulation. | our data aligns well—knowledge and satisfaction moved together positively after simulation training. |

**Objective 5 & 6: Association between knowledge/satisfaction and demographic variables**

| Study | Key Findings | Comparison with our Study |
|---|---|---|
| 11. **Sivagangabai & Jeyalakshmi (2020)** | No significant association found between demographic variables and simulation outcomes. | Consistent with our finding—no demographic factor (age, gender, residence, etc.) significantly influenced knowledge or satisfaction levels. |

**Conclusion of Comparative Analysis**

- Our findings are **highly consistent** with global and national literature.
- Clinical simulation is proven to **enhance knowledge, satisfaction, and confidence**, regardless of demographic factors.
- The **positive correlation** between knowledge and satisfaction echoes multiple studies that highlight the importance of informed participation in simulation.
- **No significant association** with demographics shows that simulation is an **equitable learning strategy**.

**Hypothesis testing:**

**H1: Significant difference between Pretest and posttest knowledge and satisfaction score**

Result: The pre-test and post-test knowledge mean differences are 2.89. The p-value is 0.000, the df=99, and the 't'-value is 33.475. The mean difference in satisfaction between the pre-test and post-test is 9.98. The p-value is 0.000, the df=99, and the 't'-value is 24.013. which show that clinical simulation training was successful and that the pre-test and post-test scores varied. Hence , H1 is accepted.

**H2: There is a significant correlation between knowledge and satisfaction in clinical simulation among nursing students.**

Result: The Raw Score method was used to calculate the correlation between the pre-test knowledge and satisfaction scores, and the results showed a weak positive correlation of 0.287 and a moderate positive correlation of 0.596. As a result, research Hypothesis H2 is accepted, and the knowledge and satisfaction scores are significantly correlated.

**H3: There is a significant association between pre-test knowledge level regarding clinical simulation among nursing student with selected demographic variable.**

Result: chi square value for age, gender, place of residence, qualification, prior knowledge of simulation based learning, and simulation experience. The p value for these factors is greater than $p<0.05$, indicating no significant connection. Therefore, the study hypothesis H3 is rejected

**H4: There is a significant association between pre-test satisfaction level regarding clinical simulation among nursing student with selected demographic variable.**

Result: Age, gender, place of residence, education, prior knowledge of simulation-based learning, and simulation experience are all represented by the chi square value. For these variables, the calculated p value is greater than the $p<0.05$ value, indicating the absence of a significant link. Therefore, the study hypothesis H4 is disproved.

In summary, the study underscores the need for a multifaceted

approach to Simulation based health education that goes beyond increasing knowledge and satisfaction of students for better skills in hospital settings. A big step forward is adding inter professional training to simulation-based education. By teaching medical professionals from many disciplines together, simulation can foster cooperation, teamwork, and a greater knowledge of one another's tasks. In practical contexts, this interdisciplinary approach is essential for enhancing patient care and results.

## REFERENCES


- Cant R., Cooper S., Sussex R., Bogossian F. What's in a Name? Clarifying the Nomenclature of Virtual Simulation. Clin. Simul. Nurs. 2019;27:26–30. doi: 10.1016/J.ECNS.2018.11.003. [DOI] [Google Scholar]
- Rim D., Shin H. Effective instructional design template for virtual simulations in nursing education. Nurse Educ. Today. 2021;96:104624. doi: 10.1016/J.NEDT.2020.104624. [DOI] [PubMed] [Google Scholar]
- Foronda C.L., Fernandez-Burgos M., Nadeau C., Kelley C.N., Henry M.N. Virtual Simulation in Nursing Education: A Systematic Review Spanning 1996 to 2018. Simul. Healthc. 2020;15:46–54. doi: 10.1097/SIH.0000000000000411. [DOI] [PubMed] [Google Scholar]
- Cant R., Ryan C., Kardong-Edgren S. Virtual simulation studies in nursing education: A bibliometric analysis of the top 100 cited studies, 2021. Nurse Educ. Today. 2022;114:105385. doi: 10.1016/J.NEDT.2022.105385. [DOI] [PubMed] [Google Scholar]
- Padilha J.M., Machado P.P., Ribeiro A., Ramos J., Costa P. Clinical virtual simulation in nursing education: Randomized controlled trial. J. Med. Internet Res. 2019;21:e11529. doi: 10.2196/11529. [DOI] [PMC free article] [PubMed] [Google Scholar]
- Chen F.Q., Leng Y.F., Ge J.F., Wang D.W., Li C., Chen B., Sun Z.L. Effectiveness of Virtual Reality in Nursing Education: Meta-Analysis. J. Med. Internet Res. 2020;22:e18290. doi: 10.2196/18290. [DOI] [PMC free article] [PubMed] [Google Scholar]
- Plotzky C., Lindwedel U., Sorber M., Loessl B., König P., Kunze C., Kugler C., Meng M. Virtual reality simulations in nurse education: A systematic mapping review. Nurse Educ. Today. 2021;101:260–6917. doi: 10.1016/j.nedt.2021.104868. [DOI] [PubMed] [Google Scholar]
- Gu Y., Zou Z., Chen X. The Effects of vSIM for NursingTM as a Teaching Strategy on Fundamentals of Nursing Education in Undergraduates. Clin. Simul. Nurs. 2017;13:194–197. doi: 10.1016/J.ECNS.2017.01.005. [DOI] [Google Scholar]
- Molloy M.A., Zhao Y., Leonard C., Chen Y., Cadavero A.A., Xing W., Vaughn J., Lin Y., Min H., Oermann M.H., et al. Nursing Students from China and United States: Learning Together through Virtual Simulation. Nurs. Educ. Perspect. 2022;43:171. doi: 10.1097/01.NEP.0000000000000929. [DOI] [PMC free article] [PubMed] [Google Scholar]
- Tjoflåt I., Brandeggen T.K., Strandberg E.S., Dyrstad D.N., Husebø S.E. Norwegian nursing students' evaluation of vSim® for Nursing. Adv. Simul. 2018;3:10. doi: 10.1186/s41077-018-0070-9. [DOI] [PMC free article] [PubMed] [Google Scholar]