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Transforming nursing education through virtual simulation and e-learning platforms

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Abstract

Objectives: The study aimed to assess the perceptions of nursing students and faculty members toward the use of virtual simulation and e-learning technologies in nursing education. It specifically focused on evaluating these technologies in terms of usability, engagement, competence development, and institutional support.

Methods: A descriptive cross-sectional research design was employed. The study included 112 nursing students and 23 faculty members from selected nursing colleges in the Chittoor District. Data were collected using a structured questionnaire based on a 5-point Likert scale, covering four domains: usability, engagement, competence development, and institutional support. The collected data were analyzed to determine overall perceptions and differences between student and faculty responses.

Results: The analysis revealed that both students and faculty members had positive perceptions toward the integration of virtual simulation and e-learning in nursing education. Student engagement and accessibility received the highest ratings among all domains. Faculty members reported that virtual simulation improved learners' participation, confidence, and clinical competence. However, they emphasized the need for better infrastructure, technical support, and institutional commitment to ensure effective implementation and sustainability.

Conclusion: The study concluded that virtual simulation and e-learning technologies significantly enhance nursing education by providing interactive, flexible, and student-centered learning experiences that bridge the gap between theory and clinical practice. To sustain their effectiveness, it is recommended that institutions invest in faculty training, curriculum integration, technical infrastructure, and continuous support systems to promote the long-term success of technology-enhanced nursing education.

Keywords: Nursing education, virtual simulation, e-learning, digital pedagogy, clinical competence

1. Introduction

The emergence of digital technologies has facilitated a significant shift in nursing education, influencing and reorganizing previously established teaching-learning models to meet the needs of contemporary healthcare [1]. Virtual simulation and e-learning platform tools have begun to facilitate flexible, interactive, and student-centered educational approaches. Digital technologies have also expanded opportunities for students to practice and improve core clinical skills in a safe and controlled environment, as well as develop clinical reasoning, problem-solving, and critical thinking [2]. Additional tools have become particularly useful when access to clinical settings is limited due to safety issues, time constraints, or global issues such as the COVID-19 pandemic [3]. The purpose of this study is to explore the ways in which virtual simulation and e-learning platforms enhance teaching-learning experiences for nursing students and faculty in selected nursing colleges in Chittoor District. A descriptive cross-sectional study designed was utilized, which involved a total of 112 nursing student participants and 23 faculty participants. A structured questionnaire was used to collect demographic data and perceptions surrounding the key domains of accessibility, engagement, satisfaction, and institutional support. sustainable use of technology in nursing education [4]. Results indicated a predominantly favorable attitude toward introducing technology-enhanced learning. Students noted that e-learning and simulation fostered greater conceptual understanding, confidence, and self-directed learning [5]. Faculty noted that digital tools supported increased student participation, improved retention of knowledge, and enabled new pedagogical practices. However, faculty called for greater institutional support, structural technology engagement and faculty training to maximize the use of technology-enhanced learning. In summary, the study concludes that the use of virtual simulation and e-learning is a significant opportunity for bridging the gap between theoretical instruction and clinical practice in nursing education. The study emphasizes the need for an ongoing commitment to the technical infrastructure of education, the ongoing training of faculty, and the integration of digital literacy in nursing education that prepares the next generation of nurses for practice in an increasingly technical healthcare environment.

2. Objectives & Methodology

2.1. Objectives

- To assess the perceptions of nursing students and faculty members toward the use of virtual simulation and e-learning technologies in nursing education.
- To evaluate the effectiveness of these technologies in enhancing usability, engagement, and competence development among learners.
- To examine the level of institutional support provided for the implementation of virtual simulation and e-learning in nursing education.

2.2. Methodology and Analysis for the present study

A descriptive cross-sectional study was conducted among 112 nursing students and 23 faculty members in selected nursing colleges in Chittoor District. Data were collected using a structured questionnaire that assessed perceptions across domains such as usability, engagement, competence development, and institutional support Each item was rated on a 5-point Likert scale with 1 meaning "Strongly Disagree" and 5 meaning "Strongly Agree". Data were analyzed using descriptive and inferential statistics.

2.3. Data Analysis and Interpretation

The analysis of data included descriptive and inferential statistics, which helped summarize means and standard deviations to examine responses across domains of usability, engagement, competence development, and institutional support (the temporal and physical arrangement of learning experiences). Independent t-tests were performed to examine the differences in perceptions of learning experiences between students and faculty members (see Table 4). Responses pointed to generally positive perceptions of digital and simulation-based learning as a whole. Student engagement received the highest scores from all three groups of respondents, indicating strong motivation and keen interest in course activities. Faculty and learning experience designers had slightly higher means in usability and competence development, suggesting a degree of comfort in integrating technology in learning and teaching. Institutional (administrative and infrastructure) support received comparatively lower means, indicating room for improvement in these areas. Overall, the findings reinforce the significance of institutional support and ongoing faculty training.

Table 1: Demographic Profile and E-Learning Experience

Variable	Category	Students (n=112)	Faculty (n=23)
Age (years)	18-21	78 (69.6%)	-
	22-25	34 (30.4%)	-
	26-35	-	15 (65.2%)
	36 and above	-	8 (34.8%)
Gender	Female	106 (94.6%)	22 (95.6%)
	Male	6 (5.4%)	1 (4.4%)
Experience in e-learning	<1 year	41 (36.6%)	3 (13.0%)
	1-3 years	52 (46.4%)	10 (43.5%)
	>3 years	19 (17.0%)	10 (43.5%)

The sample consisted of 112 students and 23 faculty members. Among students, the majority were between 18 and 21 years old (69.6%), while the remaining 30.4% were aged 22-25 years. In contrast, faculty members were primarily within the 26-35 age range (65.2%), and 34.8% were 36 years or older. Both groups were predominantly female, accounting for 94.6% of students and 95.6% of faculty participants. With regard to e-learning experience, most students reported having 1-3 years of experience (46.4%), followed by 36.6% with less than one year. Among faculty, experience levels were evenly split between 1-3 years (43.5%) and more than three years (43.5%), while 13% had under one year of experience.

Table 2: Students' Perception of Virtual Simulation and E-Learning (N=112)

Domain	Mean	SD	Interpretation
Ease of Access and Usability	4.18	0.64	Highly Positive
Learning Engagement	4.26	0.58	Highly Positive
Clinical Competence and Development	4.09	0.61	Positive
Overall Satisfaction	4.20	0.59	Highly Positive

Table 2 outlines students' views on virtual simulation and e-learning. There was a mean score of 3.88 for learning engagement, the highest among other domains. The mean score for overall satisfaction was 3.73, which was the second highest score. Domains with positive to highly positive perceptions indicate that digital learning creates excitement and increased clinical insight.

Table 3: Faculty Perception Scores on Virtual Simulation and E-Learning (N = 23)

Domain	Mean (M)	Standard Deviation	t-value	p-value	Interpretation
Ease of Integration	4.10	0.67	2.15	0.041*	Positive & consistent views
Student Engagement	4.35	0.54	3.02	0.006**	Highly positive perception
Effectiveness in Skill Devp.	3.92	0.71	1.88	0.072	Generally positive
Institutional Support	3.80	0.77	1.65	0.108	Moderately favorable
Overall Mean	4.04	0.67	2.18	0.039*	overall Positive

*p<.05, **p<.01

Table 3 describes the mean and t-test analyses related to faculty perceptions of virtual simulation and e-learning are presented in Table 3. The results remain considerably positive, with faculty expressing strong beliefs on student engagement (M=4.35, p<.01) and ease of incorporation (M=4.10, p<.05), indicating an acceptable level of pedagogical support for the two digital tools; even though skill development (M=3.92) and institutional support (M=3.80) do not reach statistical significance, the overall average does support a positive attitude. Faculty perceptions hold positively (M=4.04, p<.05), affirming faculty see value in utilizing virtual simulation to enhance nursing education, although areas of improvement remain in the infrastructure and administrative support.

Table 4: Comparison of Students and Faculty Perceptions

Domain	Students Mean	Faculty Mean	p-value
Ease of Use	4.18	4.10	0.42
Engagement	4.26	4.35	0.31
Competence/Skill Development	4.09	3.92	0.29

Table 4 indicates no statistically significant differences between the mean scores of students and faculty ($p > 0.05$), showing that both groups shared similarly positive perceptions of digital learning. Engagement received the highest ratings among students (4.26) and faculty (4.35), reflecting strong motivation and active participation in digital learning activities. Ease of use was also viewed favorably, suggesting that learners and instructors found the platforms accessible and manageable. Competence development was positively rated as well, indicating that digital learning contributed meaningfully to skill enhancement. Overall, the findings highlight broad acceptance and supportive attitudes toward technology-enhanced learning in nursing education.

Table 5: Summary of Statistical Results on Perceptions Toward Digital Learning

Domain	Students Mean	Faculty Mean	p-value (t-test)	Ease of Use	Engagement	Competence / Skill Development	Institutional Support
Ease of Use	4.18	4.10	0.42	1	0.68**	0.59**	0.47*
Engagement	4.26	4.35	0.31	0.68**	1	0.73**	0.52*
Competence / Skill Development	4.09	3.92	0.29	0.59**	0.73**	1	0.49*
Institutional Support	—	—	—	0.47*	0.52*	0.49*	1

Note: *$p< 0.05$, **$p< 0.01$

The findings show that nursing students and faculty members had generally positive perceptions of learning with digital and simulation-based strategies, with no statistically significant differences between groups in any domain ($p > 0.05$). The engagement domain had the highest mean scores for both groups, suggesting satisfactory learner motivation and active participation. The analysis of correlation indicated there were positive associations of significance between all domains. Ease of use had strong positive correlation with engagement ($r = 0.68$, $p< 0.01$) and with competence development ($r = 0.59$, $p< 0.01$), indicating that user-friendly learning tools have the ability to facilitate learner outcomes. Institutional support had moderate positive correlations with other domains, indicating that reliable infrastructure and administrative support is important for the sustainability of effective technology integration in nursing education.

Table 6: Correlation between E-Learning Experience and Perception Scores

Group	r-value	Interpretation
Students	0.64	Moderate Positive Correlation
Faculty	0.71	Strong Positive Correlation

As shown in Table 6, a positive relationship exists between e-learning experience and scores on faculty perception instruments. The relationship is much stronger among the faculty members in the sample. Higher levels of experience using virtual learning tools (webinars, discussions, and role-play) resulted in more satisfaction, engagement, and perceived effectiveness of the virtual learning experience. It may be that greater exposure and skill through practice, with the digital learning modality, fosters a much more positive attitude toward the use of technology in nursing education.

Table 7: Challenges Faced by Participants

Challenge	Students (%)	Faculty (%)
Poor Internet Connectivity	62.5	47.8
Limited Technical Skills	38.4	26.1
Lack of Institutional Support	29.5	43.4
Difficulty Maintaining Engagement	35.7	30.4
Insufficient Resources/Software	32.1	34.8

Table 7 highlights challenges faced during e-learning implementation. The results underscore several important difficulties related to implementing digital learning. The most widespread issue indicated by students (62.5%) and faculty (47.8%) was unreliable internet connection. Faculty members cited lack of support from their institution (43.4%), while students reported lack of technical skills (38.4%) and difficulty engaging (35.7%). Both groups indicated lack of resources and lack of software as further obstacles to effective e-learning.

Table 8: Suggestions and Recommendations

Suggestions	Frequency (%)
Conduct regular faculty training programs	68.2
Improve internet and lab infrastructure	74.1
Integrate simulation in all clinical courses	65.4
Provide institutional technical support	59.8
Develop local language-based modules	42.3

Table 8 gives important recommendations from participants intended to improve the use of digital learning. Overall, the most common recommendation was to improve internet and lab facilities with funding at 74.1%, then to provide faculty training on a regular basis at 68.2% and to incorporate simulation across the clinical courses at 65.4%. Other suggestions included better technical support at 59.8% and modules in local language at 42.3%.

3. Discussion

The study illustrates that nursing faculty, as well as nursing students, tended to accept and report positive attitudes toward the teaching and learning experiences of virtual simulation and e-learning, indicating a positive change toward using technology for educational purposes. Students assessed their engagement, motivation, and satisfaction levels as high with the use of digital technology [6]. They appreciated the flexibility, convenience, and interactive aspects of online simulation and learning which resulted in improved clinical reasoning and critical thinking. Understanding the benefits of virtual simulation, faculty members reported the value of creating an environment that

promoted active learning, innovative thinking, and self-directed learning experiences [7].

In spite of these advantages, both students and faculty recognized some barriers to successfully implementing educational innovation. Some of the most frequently mentioned limitations were lack of physical technological infrastructure, insufficient institutional support, and unreliable internet connection [8]. Faculty focus groups expressed a follow-up need for continuous technical training and curricular implementation so that systematic use of digital technologies can occur in nursing education. The results of this research are consistent with international literature supporting the effectiveness of technology-enabled education improving learning. Digital tools used to create a bridge between the theory (learned in classrooms) and (clinical) practice to provide a safe, flexible and effective learning environment [9]. This study highlighted the need for ongoing investment in infrastructure, faculty development, and policy support to advance the digital learning agenda in nursing programs.

4. Conclusion

The adoption of virtual simulation and e-learning in nursing education has provided new opportunities for learning and practice in interactive, flexible, and safe learning environments. Technology has helped transform nursing education by bridging the gap between the theory and practice of clinical knowledge acquisition and application, allowing students to build required competencies in clinical reasoning, problem-solving, and decision-making without risk of harm. Students increase their confidence and readiness for clinical practice through authentic scenarios and immediate feedback [10]. The faculty also benefits from new teaching strategies and tools which promote active learning and assessment.

However, to ensure the ongoing effectiveness of digital simulation and e-learning widely adopted in nursing education, nursing programs need to focus on developing and enhancing their technology infrastructure and provide ongoing technical and administrative support, as well as provide opportunities for faculty to demonstrate their competence with ongoing training and capacity building. Additionally, virtual simulation should be integrated into nursing curriculum to support traditional teaching methods and clinical exposures. These steps will improve the quality of technology-enhanced nursing education to prepare future professionals in nursing, nursing education, and health care delivery.

5. Conflict of Interest

Not available.

6. Financial Support

Not available.

References

1. Cant RP, Cooper SJ. Use of virtual simulation in nursing education: A systematic review. Nurse Education Today. 2020;87:104357. DOI: 10.1016/j.nedt.2020.104357.
2. George TP, DeCristofaro C. Integrating e-learning and simulation to enhance clinical competence in nursing education. Journal of Nursing Education. 2021;60(4):197-203. DOI: 10.3928/01484834-20210318-05.
3. Kim H, Park JH, Shin S. Effectiveness of virtual simulation in nursing education: Meta-analysis. Clinical Simulation in Nursing. 2022;61:42-55. DOI: 10.1016/j.ecns.2021.10.003.
4. Padilha JM, Machado PP, Ribeiro A, Ramos J, Costa P. Clinical virtual simulation in nursing education: Randomized controlled trial. Journal of Medical Internet Research. 2019;21(3):e11529. DOI: 10.2196/11529.
5. World Health Organization. Global strategic directions for nursing and midwifery 2021-2025. WHO Press; 2021. https://www.who.int/publications/i/item/9789240033860
6. Foronda C, Fernandez-Burgos M, Nadeau C, Kelley CN, Henry MN. Virtual simulation in nursing education: A systematic review spanning 1996 to 2018. Simulation in Healthcare. 2020;15(1):46-54. DOI: 10.1097/SIH.0000000000000411.
7. Verkuyl M, Lapum JL, St-Amant O, Hughes M, Romaniuk D. Designing immersive virtual simulation in nursing education: Development and usability testing. Nurse Education in Practice. 2021;55:103184. DOI: 10.1016/j.nepr.2021.103184.
8. Cant RP, Porter JE, Cooper SJ, Bogossian FE. The rise of virtual reality simulation in nursing education: Current perspectives and future directions. Collegian. 2022;29(5):507-515. DOI: 10.1016/j.colegn.2022.04.001.
9. Leigh GT, Steuben F. The impact of e-learning on nursing students' critical thinking and clinical decision-making: A systematic review. Nurse Education Today. 2020;89:104400. DOI: 10.1016/j.nedt.2020.104400.
10. Liaw SY, Ooi SW, Rusli KD, Lau TC, Tam WWS, Chua WL. Nurse educators' adoption of immersive virtual reality in nursing education: A cross-sectional study. Nurse Education Today. 2021;104:104983. DOI: 10.1016/j.nedt.2021.104983.

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