Journal of Integrative Nursing and Palliative Care (JINPC)

Original Article

Volume 5 | Page 145-152

The Role of Scenario-Based Training in Developing Core Competencies among Nursing Students: A Quasi-Experimental Study

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Abstract

Competency refers to the combination of knowledge, skills, and abilities required to effectively perform specific tasks. In pediatric nursing, the unique demands of the field pose challenges for students in developing essential competencies. Consequently, innovative training approaches are needed, with scenario-based learning emerging as a modern method for clinical education. This study aimed to evaluate the impact of scenario-based education on nursing students' core competencies. A quasi-experimental design with pre-test and post-test assessments was employed. Seventy-two nursing students were recruited using the census method and randomly assigned to either an intervention group (n = 33) or a control group (n = 40). Data were collected using a demographic questionnaire and the Nursing Students' Clinical Competencies Questionnaire. Both groups completed pre-tests before the intervention, and post-tests were administered one month later. In the intervention group, the mean core competency score increased from 229.05 (SD = 36.58) before training to 247.05 (SD = 36.48) after training (P > 0.05). The control group's mean score rose slightly from 235.56 (SD = 27.94) to 240.76 (SD = 35.36), with no significant difference (P < 0.05). Independent t-tests revealed no statistically significant differences between the intervention and control groups either before or after the intervention (P > 0.05). The findings suggest that scenario-based training can enhance core competencies among nursing students. Educational administrators and faculty are encouraged to integrate scenario-based teaching strategies into nursing curricula. Further research is warranted to explore the combined effects of scenario-based learning with other instructional methods, such as team-based and problem-based learning.

Keywords: Core competencies, Scenario-based education, Scenario, Nursing students

Introduction

Competence encompasses an individual's ability and actions to fulfill professional responsibilities, whereas competency reflects the ability to perform effectively in specific situations. In nursing, competency has always been central, in contrast to other healthcare professions where task completion is the primary focus [1]. Core competencies in nursing are defined as the essential skills and abilities required to perform nursing practice successfully [2], comprising critical thinking, general clinical skills, basic medical knowledge, communication and teamwork, patient care, ethics, responsibility, and lifelong learning [3].

The overall effectiveness of a country's healthcare system heavily relies on the competence of its nurses, which explains why nursing competency has been a major focus over the past century. Developed countries employ diverse strategies to enhance nurses' competencies, including continuing education, theoretical and practical assessments, structured work experience, and academic degrees [4]. Competence among newly graduated nurses, as the output of formal nursing education, is crucial for ensuring safe patient care in complex hospital settings [5].

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Received: 27 August 2024; **Revised:** 19 November 2024; **Accepted:** 24 November 2024; **Published:** 24 December 2024

How to Cite This Article: Ji PE, Eun CJ. The Role of Scenario-Based Training in Developing Core Competencies Among Nursing Students: A Quasi-Experimental Study. J Integr Nurs Palliat Care. 2024;5:145-52. https://doi.org/10.51847/FvexiNkizP

However, studies suggest that undergraduate nursing education often falls short in preparing novices for the realities of clinical practice [6, 7]. For example, critical thinking—a key core competency—has been reported as the lowest self-assessed skill among newly graduated nurses [8]. Research in Iran similarly indicates that novice nurses frequently lack the cognitive and practical skills required to meet the demands of clinical environments [9, 10]. Challenges for nursing students include unpreparedness for clinical roles, weak professional competence, low self-confidence, difficulty meeting colleagues' expectations, and emotional stress [11]. Newly graduated nurses also face transition challenges, workload pressures, poorly organized patient care, and inadequate responses to patient needs due to insufficient competency [12].

In pediatric nursing, children's physiological vulnerabilities make them especially susceptible to infections and injuries, necessitating precise and competent care [13]. Nursing students must acquire sufficient competencies through education to address the healthcare needs of pediatric patients and their families and to promote child health in clinical settings [14].

To address these challenges, educators are seeking teaching methods that actively engage students in learning while providing feedback to enhance clinical knowledge and skills [15]. Scenario-based learning has emerged as a dynamic, interactive strategy that develops essential 21st-century skills, including analytical thinking, problem-solving, communication, and teamwork [16–19]. Research indicates that scenario-based methods improve students' self-confidence, critical thinking, decision-making, and self-directed learning abilities [20–22].

Several studies support the efficacy of scenario-based training in pediatric nursing. Yang found that scenario-based simulation significantly improved students' theoretical and practical scores compared to traditional instruction [23]. Uysal reported a reduction in common errors during practical exams and emphasized that scenario-based learning enhances knowledge retention [24]. Similarly, Izadi *et al.* demonstrated that ethics training using scenario-based methods improved adherence to patient rights and patient satisfaction immediately and one month post-intervention [25]. Du *et al.* observed that clinical scenario-based simulations enhanced competencies in pressure ulcer identification, disease prevention, and rehabilitation [26]. Pediatric simulations provide opportunities for students to apply classroom knowledge to clinical scenarios and receive instructor feedback [27, 28], improving self-confidence and satisfaction [29, 30]. High-fidelity simulations have also been shown to enhance knowledge, skills, and confidence in pediatric intensive care contexts [28, 31].

Overall, literature indicates that scenario-based training can positively influence multiple dimensions of nursing competencies, particularly in pediatric care. Given the previously reported deficiencies in clinical competence in Iran and the lack of studies examining the impact of scenario-based methods on core competencies, this study aims to evaluate the effect of scenario-based education on the core competencies of nursing students at the Nursing Faculty of Kerman University of Medical Sciences.

Materials and Methods

This quasi-experimental study aimed to examine the effect of scenario-based training on nursing students' core competencies. The research was conducted in 2021 at the Faculty of Nursing and Midwifery of Kerman University of Medical Sciences, with ethical approval from the university's Ethics Committee (IR.KMU.REC.1400.385).

All nursing interns who had successfully completed their pre-internship theory exams and OSCE assessments were recruited through a census method (N = 74). Students were randomly assigned based on a lottery system to either the first semester internship group (n = 40) or the second semester group (n = 34). One student was excluded, leaving 73 participants for analysis (intervention group = 34, control group = 39).

To prevent information exchange between groups, the control group completed their post-tests before the intervention began with the experimental group **(Figure 1)**. Both pre-test and post-test data were collected to assess the students' core competencies, ensuring a comparison of performance before and after scenario-based training.

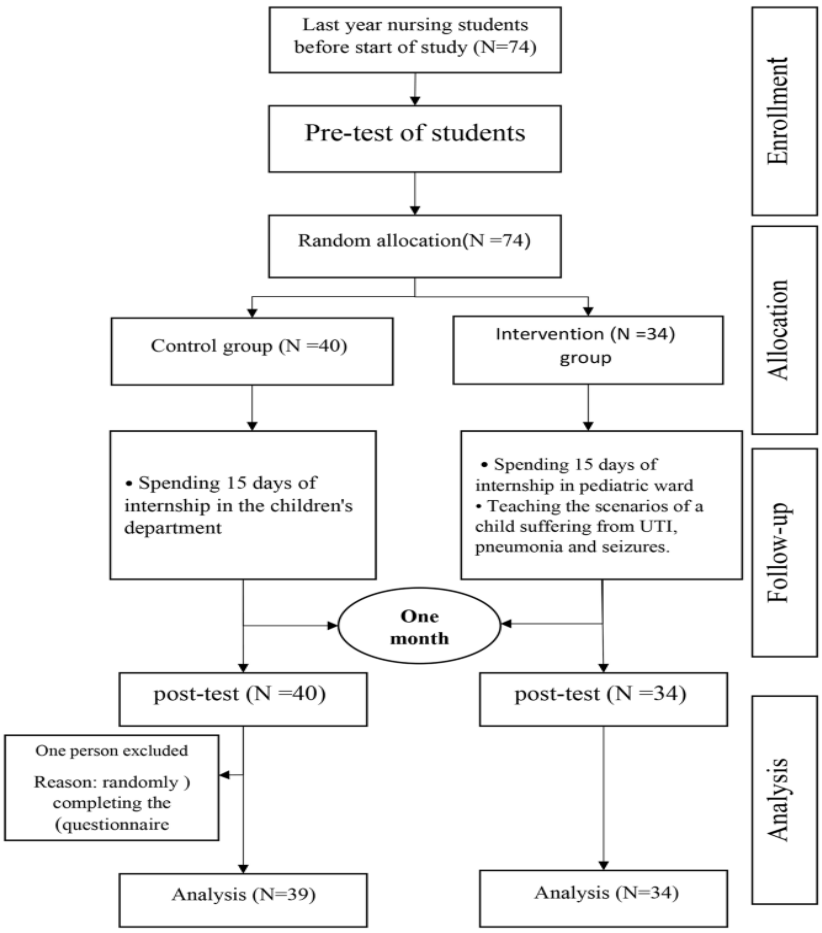

Figure 1. Flow chart of the study

Afterward, the participants were divided into two groups using the WhatsApp application, and the study objectives were explained to all students. Informed consent was obtained from each participant prior to enrollment. Students were informed that participation was voluntary, they could withdraw at any time without any negative impact on their academic standing, and the confidentiality and anonymity of their personal data would be maintained through coding. Following this, all participants completed the Nursing Students' Core Competency Questionnaire (NSCCQ).

For the control group, students attended the pediatric ward in groups of eight according to the randomized list for a 15-day period, following the standard clinical training protocol of the faculty. During the first three days, rules and procedures were explained, and routine care was demonstrated by the supervisor. From the fourth day onward, students were responsible for patient care under supervision, observing cases such as seizures, urinary tract infections, and pneumonia. The students continued this supervised care until the fifteenth day, using a case-method form to document care, and completed the NSCCQ one month later as a post-test.

In the intervention group, students also attended the pediatric ward in groups of eight. On the first day, the head nurse introduced the prevalent cases in the department (seizure, urinary infection, pneumonia), and students were tasked with collecting clinical information, taking patient histories, monitoring diagnosis and treatment, and providing nursing care for the first ten days of the internship. During this period, a senior pediatric nursing expert mentored the students for one hour daily, answering questions related to documentation and clinical care.

Following the initial ward experience, students in the intervention group participated in scenario-based training sessions via Skyroom in groups of eight. Each session lasted two hours and included video presentations, images, and guided group discussions. Instructors consisted of a pediatric nursing doctor and a master's level nursing student. Scenarios were developed in advance from simple to complex cases, reviewed, and approved for content validity by faculty experts, with quality control provided by two pediatric specialists.

During the sessions, each scenario began with a senior student presenting the patient history, followed by guided questions about patient care. Students were asked to describe their proposed interventions, which were subsequently reviewed and analyzed by the instructor. Videos demonstrating proper management of each scenario were shown, and recent related articles were discussed to reinforce evidence-based practice. The sessions concluded with a summary of the key points. Scenario discussions were conducted in the last four days of the

internship to allow students to familiarize themselves with real cases before analyzing the simulated scenarios. NSCCQ post-tests were administered one month after the intervention.

Demographic data were collected through a questionnaire capturing age, sex, marital status, native status, year of university entry, residence status, completion of practical nursing courses, interest in nursing, number of completed units, GPA, and prior familiarity with scenario-based training.

The NSCCQ, developed by Perng and Watson, contains 48 items covering eight competency domains: critical thinking, general clinical skills, basic medical sciences, communication, care, ethics, responsibility, and lifelong learning. Each domain includes six items rated on a 7-point Likert scale (1 = completely incapable, 7 = fully capable), yielding total scores from 48 to 336, with higher scores indicating greater competency [3].

The questionnaire was translated into Farsi and back-translated by the researcher. Content validity was evaluated qualitatively and quantitatively by ten faculty members using a 4-point Likert scale, resulting in a content validity index (CVI) of 1. Reliability was assessed in a pilot study with 40 students, yielding a Cronbach's alpha of 0.94, confirming the instrument's reliability and validity.

Data analysis was performed using SPSS version 26. Descriptive statistics, chi-square tests, paired t-tests, and independent t-tests were applied, and normality was checked with the Kolmogorov-Smirnov test. Statistical significance was set at $p < 0.05$.

Ethical approval

Approval for this study was obtained from the Research Ethics Committee of Kerman University (IR.KMU.REC.1400.385). All procedures adhered strictly to the relevant ethical guidelines and regulations, and participants provided written informed consent prior to participation.

Results and Discussion

The two groups, intervention and control, were comparable across all measured demographic factors, including age, sex, marital status, and academic performance, with no statistically significant differences observed ($p < 0.05$) **(Table 1)**. Of the total participants, 38 (52%) were female. The mean age in the intervention group was 22.5 years (SD = 1.07), compared to 22.3 years (SD = 1.61) in the control group. The mean grade point average for the intervention group was 16.20 (SD = 1.40), while the control group had a mean GPA of 16.38 (SD = 0.84).

Table 1. Baseline Characteristics of Participants by Study Arm

Variable	Category	Intervention Group n (%)	Control Group n (%)	Test Statistic	p-value
Gender	Male	17 (50.0)	18 (46.2)	0.10	0.816
	Female	17 (50.0)	21 (53.8)		
Marital Status	Single	28 (82.4)	31 (79.5)	0.89	0.640
	Married	6 (17.6)	7 (17.9)		
	Other	0 (0.0)	1 (2.6)		
Resides in Kerman	Yes	19 (55.9)	22 (56.4)	0.002	0.962
	No	15 (44.1)	17 (43.6)		
University Entry Year	2015	1 (2.9)	0 (0.0)	2.16	0.338
	2016	5 (14.7)	3 (7.7)		
	2017	28 (82.4)	36 (92.3)		
Current Residence	Dormitory	17 (50.0)	23 (58.9)	0.59	0.744
	With family	16 (47.1)	15 (38.5)		
	Alone	1 (2.9)	1 (2.6)		
Completed Practical Nursing Course	Yes	2 (5.9)	3 (7.7)	0.09	0.766
	No	32 (94.1)	36 (92.3)		
Interest in Nursing	Very little	3 (8.8)	0 (0.0)	5.59	0.231
	Little	4 (11.8)	4 (10.3)		
	Moderate	9 (26.5)	17 (43.6)		
	Much	9 (26.5)	11 (28.2)		
	Very much	9 (26.5)	7 (17.9)		
Familiarity with Scenario-Based Method	None	21 (61.8)	24 (61.5)	3.67	0.159
	Somewhat	7 (20.6)	13 (33.3)		
	Yes	6 (17.6)	2 (5.1)		

In the intervention group, students' overall core competency scores increased from a mean of 229.05 (SD = 36.58) before the training to 247.05 (SD = 36.48) after the training, indicating a statistically significant improvement (P

< 0.001). When examining the individual competency areas, all dimensions showed significant enhancement following the intervention, except for critical thinking and ethics (P < 0.05). Conversely, the control group did not experience a notable change in total core competency scores, with pre-test and post-test means of 235.56 (SD = 27.94) and 240.76 (SD = 35.36), respectively (P > 0.05). Within the control group, only the basic sciences domain showed a significant increase, while the remaining competencies did not exhibit significant changes **(Table 2)**.

Table 2. Comparison of the score of core competencies in the intervention and control groups, before and after the intervention

Competency Domain	Group	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Effect Size (Cohen's d)	Between-Group Difference Statistic (p-value) (b)	Within-Group Change Statistic (p-value) (c)
Critical Thinking	Control	4.39 ± 28.48	5.04 ± 28.71	0.04	−0.29 (0.772)	−0.42 (0.675)
	Intervention	5.47 ± 28.00	5.41 ± 29.26	0.27	1.59 (0.121)	0.44 (0.657)
Clinical Skills	Control	4.42 ± 27.74	28.33 ± 5.12	0.10	−0.68 (0.509)	−0.64 (0.523)
	Intervention	5.84 ± 26.97	5.58 ± 29.29	0.59	−3.49 (0.001)	0.76 (0.446)
Basic Medical Sciences	Control	3.14 ± 26.56	5.21 ± 28.64	0.42	−2.64 (0.012)	−0.22 (0.825)
	Intervention	5.58 ± 26.32	5.25 ± 28.82	0.72	−4.21 (0.000)	0.14 (0.882)
Communication Skills	Control	4.30 ± 28.58	5.50 ± 28.84	0.04	−0.30 (0.762)	−0.41 (0.683)
	Intervention	5.52 ± 28.11	4.73 ± 31.26	0.77	−4.50 (0.000)	1.99 (0.050)
Care	Control	5.05 ± 29.30	5.14 ± 30.48	0.25	−1.58 (0.122)	−0.72 (0.471)
	Intervention	5.13 ± 28.44	4.88 ± 31.82	0.77	−4.51 (0.000)	1.13 (0.261)
Ethics	Control	5.42 ± 32.15	5.74 ± 32.28	0.02	−0.13 (0.892)	−0.59 (0.552)
	Intervention	5.58 ± 31.38	5.36 ± 32.70	0.27	−1.61 (0.116)	0.32 (0.747)
Responsibility	Control	4.80 ± 32.00	4.99 ± 32.56	0.10	−0.65 (0.519)	−1.09 (0.276)
	Intervention	5.02 ± 30.75	5.18 ± 32.50	0.50	−2.92 (0.006)	−0.54 (0.957)
Continuous Learning	Control	4.48 ± 30.71	4.93 ± 30.89	0.03	−0.20 (0.839)	−1.49 (0.140)
	Intervention	4.84 ± 29.08	5.26 ± 31.38	0.60	−3.51 (0.001)	0.40 (0.686)
Total Core Competencies	Control	27.94 ± 235.56	35.36 ± 240.76	0.16	−1.03 (0.308)	−0.86 (0.393)
	Intervention	36.58 ± 229.05	36.48 ± 247.05	0.72	−4.21 (0.000)	0.74 (0.458)

Notes:
- (b) Independent samples t-test comparing post-intervention scores between groups.
- (c) Paired t-test evaluating pre-to-post change within each group.
- Bold p-values indicate statistical significance (p < 0.05).
- Effect sizes are standardized mean differences (Cohen's d).
- Higher scores reflect greater competency.

The independent t-test comparing the intervention and control groups at both the pre-test and post-test stages did not reveal any significant differences in overall core competency scores or in any of the specific dimensions (pre-test: TS = 0.86, P < 0.05; post-test: TS = 0.74, P < 0.05) **(Table 2)**.

The present study demonstrated that scenario-based training had a positive effect on the core competencies of nursing students in the intervention group. Notable improvements were observed in clinical skills, basic sciences, communication and teamwork, care, responsibility, and continuous learning. However, ethics and critical thinking did not show a statistically significant change. Research exploring the effects of scenario-based education on nursing students' core competencies remains limited.

For instance, Karageorge *et al.* evaluated crisis management skills among pediatric ICU nurses and reported that simulated scenarios enhanced knowledge, teamwork, and self-confidence when managing severe pediatric conditions [33]. These findings are in line with our results regarding communication skills and basic science competency, though their intervention relied on computer-based simulation rather than direct clinical experience. Similarly, Pinar *et al.* examined scenario-based simulation for maternal nursing using PowerPoint-based exercises. They found increased knowledge and skills in the intervention group, which aligns with our findings on teamwork and clinical skill improvement [32]. Their study, however, was limited by small sample sizes and assessed fewer competency dimensions than the present study.

Baek *et al.* showed that scenario-based learning enhanced team efficiency, systems thinking, and problem-solving among nursing students without prior clinical experience [34]. These results correspond with the improvements in critical thinking and communication skills observed in our study. A key distinction is that Baek et al.'s students

actively generated potential care scenarios, reached consensus solutions, and implemented them, whereas our study followed pre-designed scenarios. Additionally, participants in Baek *et al.* were final-year students.

Izadi *et al.* reported that scenario-based learning combined with group discussions improved nurses' ethical compliance and patient satisfaction [25, 27]. In contrast, our intervention did not significantly improve ethics, likely because our scenario sessions did not focus exclusively on ethical issues.

In the control group of this study, overall core competency scores showed minimal change, with a significant increase observed only in the basic sciences dimension. This is consistent with Izadi *et al.* who found no significant improvement in the control group regarding ethical practice or patient satisfaction [25]. Delnavaz *et al.* however, reported significant improvements in knowledge and performance among lecture-based control groups [33], a discrepancy likely due to differences in the teaching methods and competency domains assessed.

The lack of significant differences between intervention and control groups in our study differs from Yang (2018), who found that pediatric scenario-based simulations significantly improved both theoretical and practical performance compared to controls [23]. This discrepancy may be attributed to more extensive hands-on practice in Yang's intervention. Jeong *et al.* observed significant improvements in knowledge, self-efficacy, and clinical reasoning in both intervention and control groups after virtual reality simulation for COVID-19 scenarios, but no between-group differences were detected, which is similar to the present study [35].

Du *et al.* found that clinical scenario simulations significantly increased OSCE scores for pressure ulcer risk assessment in nursing students [26]. Our results differ, possibly because the current intervention was conducted online rather than in person with simulated patients. Liu and Xiao demonstrated that combining scenario simulations with progressive teaching significantly improved students' knowledge, nurse-patient interaction, critical thinking, and comprehensive performance [34]. The greater impact in that study may be explained by the integrated teaching method, which combined theoretical and practical content with role-playing exercises, a more immersive approach than the method used in the present study.

Zhang *et al.* reported that operating room nurses in the intervention group demonstrated significantly improved clinical skills compared to the control group after undergoing hierarchical training combined with simulation scenarios [36]. These findings differ from the clinical skills results in the present study, likely because Zhang et al.'s intervention was conducted face-to-face in a hospital setting, whereas our study utilized a virtual platform.

Conclusion

The findings of this study indicate that scenario-based training delivered through a virtual platform can effectively enhance the core competencies of nursing students. Improvements were observed in clinical skills, foundational medical knowledge, communication and teamwork, patient care, responsibility, and continuous learning. By fostering these competencies, students are better equipped to deliver safe, high-quality care to pediatric patients and contribute positively to community health. This approach bridges the gap between theoretical learning and practical application, shifting students from passive learning methods toward more active engagement with real-life scenarios. Consequently, scenario-based education can strengthen students' professional preparedness and clinical confidence.

For nursing administrators and educational planners, these results highlight the potential value of incorporating scenario-based learning into training programs for future nurses. A limitation of this study was the use of self-report questionnaires, which may have led some students to overestimate their competencies. Participants were, however, encouraged to complete the instruments accurately to mitigate this bias.

Among the strengths of the study was its focus on assessing core competencies, a topic less frequently addressed in prior research. Despite challenges posed by the COVID-19 pandemic and the reliance on online instruction, scenario-based training promoted better information retention and deeper learning. Additionally, the intervention may contribute to improved nursing efficiency and performance, ultimately enhancing the quality of care provided. These results can serve as a framework for designing future studies in nursing education.

Acknowledgments: None.

Conflict of interest: None.

Financial support: None.

Ethics statement: None.

References

1. Zumstein-Shaha M, Grace PJ. Competency frameworks, nursing perspec-tives, and interdisciplinary collaborations for good patient care: delineating boundaries. Nurs Philos. 2023;24(1):e12402.

2. Axley L, Competency, editors. A concept analysis. Nursing forum. Wiley Online Library; 2008.
3. Perng S-J, Watson R. Psychometric testing of an instrument measuring core competencies of nursing students: an application of Mokken scaling. Adv Nurs Sci. 2013;36(2):146–57.
4. DeNisco SM. Advanced practice nursing: essential knowledge for the Profes- sion: essential knowledge for the Profession. Jones & Bartlett Learning; 2019.
5. Zhang B, Ma Q-Y, Cui X-S, Xiao Q-G, Jin H-Y, Chen X, et al. Effectiveness of experiential teaching method on the development of nursing students' skill competence: a systematic review and meta-analysis. Front Nurs. 2021;7(4):359–68.
6. Hickey MT. Baccalaureate nursing graduates' perceptions of their clini- cal instructional experiences and preparation for practice. J Prof Nurs. 2010;26(1):35–41.
7. Maria HSY, Mei WL, Stanley LKK. The transition challenges faced by new graduate nurses in their first year of professional experience. GSTF J Nurs Health Care (JNHC). 2020;5(1).
8. Willman A, Bjuresäter K, Nilsson J. Newly graduated nurses' clinical com- petencies and need for further training in acute care hospitals. J Clin Nurs. 2020;29(13–14):2209–20.
9. Aliyari N, Fallahi Khoshknab M, Khankeh H, Hoseini M, Yazdani M. The effec- tiveness of cognitive behavioral group intervention on the stress levels of new graduate nurses. Iran J Nurs. 2015;28(93):11–21.
10. Rafii F, SAJADI HM, Seyedfatemi N. Rezaeı M. Nurse managers' strategies for facilitating transition process newly nurses to clinical nurses. Nurs. Manag. 2015; 4(2).
11. Abedi H A, Heidari A, Salsali M. New Graduate Nurses' Experiences of their Professional Readiness During Transition to Professional Roles. Iranian J. Med. Edu. 2004; 4(2) :69-78
12. Zhang Y, Wu J, Fang Z, Zhang Y, Wong FKY. Newly graduated nurses' intention to leave in their first year of practice in Shanghai: a longitudinal study. Nurs Outlook. 2017;65(2):202–11.
13. Kim MYKJ, Kwon YJ, Kwon IS, Kim SH, Kim JS, et al. Child health promotion care. Volume 2. Paju: Soomoonsa; 2018. pp. 384–97.
14. Korean Accreditation Board of Nursing Education. The manual of nursing education accreditation for university. Seoul: Korean Accreditation Board of Nursing Education; 2021. pp. 58–9.
15. Friederichs H, Brouwer B, Marschall B, Weissenstein A. Mastery learning improves students skills in inserting intravenous access: a pre-post-study. GMS J Med Educ. 2016;33(4):Doc56.
16. Amorim PG, Morcillo A, Fraga A, Brandão M, Belluomini F, Baracat E. Realistic simulation in pediatric emergency: evaluation of strategy as a teaching tool for medical students. Arch Emerg Med Crit Care. 2018;3(1):1036.
17. D'souza M, Venkatesaperumal R, Chavez F, Parahoo K, Jacob D. Effectiveness of simulation among undergraduate students in the critical care nursing. Int Archives Nurs Health Care. 2017;3(4):1–8.
18. Battista A. An activity theory perspective of how scenario-based simulations support learning: a descriptive analysis. Adv Simul. 2017;2(1):1–14.
19. ACARA. Australian Curriculum Assessment and Reporting Authority. General capabilities in the Australian Curriculum. 2012.
20. Jung D, Lee SH, Kang SJ, Kim J-H. Development and evaluation of a clinical simulation for new graduate nurses: a multi-site pilot study. Nurse Educ Today. 2017;49:84–9.
21. Abdou F, Dogham R. Impact of using Simulation on critical care nursing students' knowledge and skills of Acute Respiratory Distress Syndrome. IOSR J Nurs Health Sci. 2016;5:28–425.
22. Thomsen B, Renaud C, Savory S, Romans E, Mitrofanov O, Rio M, et al. editors. Introducing scenario based learning: Experiences from an undergraduate electronic and electrical engineering course. IEEE Educon 2010 Conference; 2010: IEEE.
23. Yang M. Application of scenario Simulation Method in Pediatric clinical nurs- ing teaching. J Clin Nurs Res. 2018;2(3).
24. Uysal N. Improvement of nursing students' learning outcomes through scenario-based skills training. Rev Lat Am Enfermagem. 2016;24:e2790. doi:10.1590/1518-8345.1310.2790.
25. Izadi F, Bijani M, Fereidouni Z, Karimi S, Tehranineshat B, Dehghan A. The effectiveness of teaching nursing Ethics via scenarios and group discussion in nurses' adherence to ethical Codes and Patients' satisfaction with Nurses' performance. TheScientificWorldJournal. 2020;2020:5749687.
26. Du Y-L, Ma C-H, Liao Y-F, Wang L, Zhang Y, Niu G. Is clinical scenario Simula- tion Teaching Effective in cultivating the competency of nursing students to recognize and assess the risk of pressure ulcers? Risk Manage Healthc Policy. 2021;14:2887.
27. Cardoza MP, Hood PA. Comparative study of baccalaureate nursing student self-efficacy before and after simulation. CIN: Computers Informatics Nursing. 2012;30(3):142–7.
28. Parker RA, McNeill JA, Pelayo LW, Goei KA, Howard J, Gunter MD. Pediatric clinical simulation: a pilot project. J Nurs Educ. 2011;50(2):105–11.
29. Lubbers J, Rossman C. Satisfaction and self-confidence with nursing clinical simulation: novice learners, medium-fidelity, and community settings. Nurse Educ Today. 2017;48:140–4.

30. Lubbers J, Rossman C. The effects of pediatric community simulation experience on the self-confidence and satisfaction of baccalaureate nursing students: A quasi-experimental study. Nurse Educ Today. 2016;39:93–8.
31. Karageorge N, Muckler VC, Toper M, Hueckel R. Using simulation with deliber- ate practice to improve pediatric ICU nurses' knowledge, clinical teamwork, and confidence. J Pediatr Nurs. 2020;54:58–62.
32. Pinar G, Abay H, Akalin A. The effect of scenario-based simulation training technology on knowledge and skills of maternity nursing students in Turkey. Int J Dev Res. 2016;6(6):8096–101.
33. Delnavaz S, Hassankhani H, Roshangar F, Dadashzadeh A, Sarbakhsh P, Gha-fourifard M, et al. Comparison of scenario based triage education by lecture and role playing on knowledge and practice of nursing students. Nurse Educ Today. 2018;70:54–9.
34. Liu B, Xiao C. Application analysis of scenario simulation teaching method combined with progressive teaching mode in clinical teaching of orthopae- dic nursing. Int J Electr Eng Educ. 2021:00207209211003265.
35. Jeong Y, Lee H, Han JW. Development and evaluation of virtual reality simulation education based on coronavirus disease 2019 scenario for nursing students: a pilot study. Nurs open. 2022;9(2):1066–76.
36. Zhang M, Fan L, Zhou Y. Practical value of hierarchical teaching combined with simulation scenario training for operating-room nurses. Am J Transla- tional Res. 2021;13(3):1833.