Original Article

Comparing the effects of face-to-face and virtual education on nursing students' communication skills

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Abstract

Background and aims: The quality of nurse-patient communication has significant effects on patient care outcomes. Therefore, education of communication skills (CSs) to nurses and nursing students can improve patient care outcomes. The aim of this study was to compare the effects of face-to-face education (FTFE) and virtual education (VE) on CSs among nursing students.

Methods: This quasi-experimental study was conducted in 2021. Participants were 51 senior nursing students in their internship course in Shahrekord Faculty of Nursing and Midwifery, Shahrekord, Iran. They were recruited to the study through a census and were allocated to FTFE and VE groups through the Random Allocation Software. FTFE was provided in two sessions through the lecture and the question and answer methods, while VE was provided in a single online session through simulated multimedia content. Participants' CSs were assessed before and ten days after the study intervention through a 50-minute Objective Structured Clinical Examination with five consecutive stations on communication with elderly patient, communication with adolescent patient, communication with aggressive patient, communication with illiterate or non-communicative patient, and communication for consent. Data were analyzed using the SPSS software (v. 23.0) and through the independent sample t, paired-sample t, and chi-square tests and the multivariate analysis of variance (MANOVA).

Results: The posttest mean scores of CSs in both groups were significantly greater than their corresponding pretest values ($P<0.05$). However, there were no significant differences between the groups respecting the pretest and the posttest mean scores of CSs. The pretest mean score of the communication with elderly patient skill and the posttest mean score of the communication with aggressive patient skill had significant relationship with participants' place of residence and gender, respectively ($P<0.05$).

Conclusion: VE is as effective as FTFE in significantly improving nursing students' CSs. Therefore, quality VE programs are recommended to fulfill the different educational needs of nursing students.

Keywords: Communication skill, Face-to-face education, Virtual education, Nursing student

Introduction

Communication skills (CSs) are a set of behaviors which determine the quality of interpersonal relationships (1). Nurses, as the largest group of healthcare providers, are the first line of response to crises and disasters and are the coordinators of healthcare delivery team. Accordingly, they need to have adequate skills to communicate with patients and their family members.

The quality of nurse-patient communication significantly affects patients' health and adherence to treatments (2). A global survey reported that patient satisfaction with hospital services had significant correlation with nurses' CSs (3). Poor communication negatively affects patient care and is associated with stress, misunderstanding, despair, and anger for patients and their family members, poor treatment outcomes (4), and life-threatening medical errors (5). Previous studies reported that nurses and nursing students had poor CSs (5-8), established poor

and fragile communications with patients, and allocated limited amount of time to communicate with patients, resulting in patient dissatisfaction with communications (9-12). A major factor contributing to poor nurse-patient communication is nurses' limited knowledge about CSs due to their limited education (13-15). Therefore, studies considered education as a potentially effective strategy for CS improvement and highlighted the importance of integrating CSs as an inseparable component in formal and in-service education programs (6,16-20).

Although all educational programs can promote learning, the depth and effectiveness of learning largely depend on the type of educational strategies. Face-to-face education (FTFE), also known as traditional education, is an educational strategy in which all educational activities are performed in face-to-face sessions held at a specific time and in a specific place such as classrooms (21,22). The most common teaching methods in FTFE are lecture,

question and answer, and problem-based learning (23-25). Lack of time and place for education, lack of experienced instructors, and lack of financial resources are the major shortcomings of FTFE (26).

Virtual education (VE) is another educational strategy. It was developed and introduced in the 21th century in order to improve learning outcomes (27). VE helps save time and costs, provides ample opportunities for self-study, facilitates easy and full-time access to educational materials, speeds up the process of education, provides the opportunity to select the preferred instructor, enables learners to review educational materials for many times, enables instructors to provide formative feedback to learners, and prevents unnecessary duplications in preparing educational materials (26,28,29). It does not necessitate the attendance of instructors and learners at a given place and hence, has turned into the main and the safest educational strategy in the current coronavirus disease 2019 pandemic (30-33).

Previous studies reported inconsistent results respecting the effects of VE and FTFE. Some studies reported that these methods produced the same learning outcomes (34-38), while some studies reported the greater effectiveness of FTFE (39-42) or VE (24). This inconsistency may be due to the effects of different factors on learning outcomes such as educational materials, education duration, complexity of learning, and VE infrastructures. To the best of our knowledge, no study had yet evaluated the effects of VE and FTFE on CSs among nursing students in Iran. Therefore, the present study was conducted to narrow this gap. The aim of the study was to compare the effects of VE and FTFE on CSs among nursing students.

Methods
Design
This quasi-experimental study was conducted in 2021.

Participants and setting
Study population consisted of all 51 senior nursing students in their internship education in Shahrekord Faculty of Nursing and Midwifery, Shahrekord, Iran. All of them were recruited to the study through a census. Participants were allocated to a VE and an FTFE group through the Random Allocation Software.

Data collection
Participants' CSs were assessed using a fifty-minute Objective Structured Clinical Examination (43-45) with five consecutive stations. The content of the stations was about communication with elderly patient, communication with adolescent patient, communication with aggressive patient, communication with illiterate or non-communicative patient, and communication for consent. Each station had a scenario, a trained simulated patient who played out the scenario, and a station guide. In each station, students read station guide which consisted of patient's history and the necessary care services and

then, communicated with the patient and provided care services and patient education. Students' performance was video-recorded (46,47) using a fixed camera in each station and then, a nurse with master's degree and a work experience of thirteen years watched the videos to score participants' performance using a checklist. The nurse was blind to the study groups.

The performance evaluation checklist of each station had items on 8–10 expected CSs of that station. Skills were scored either zero ("Not used") or 1 ("Used"). Several instructors from the study setting assessed the validity of the scenarios and the checklist. They were asked to rate the relevance, clarity, and simplicity of the checklist items as "Non-acceptable" (scored 1), "Needs major revision" (scored 2), "Needs minor revision" (scored 3), and "Acceptable" (scored 4). Finally, the relevance, clarity, and simplicity percentages of each item were calculated and items with percentages less than 96 were revised (48,49). The reliability of the checklist was assessed through the inter-rater method, in which two experienced hospital nurses with master's degree simultaneously rated the performance of fifteen students in each station. They had received training on acceptable performance in each station and its accurate assessment. Finally, the correlations of their assessment scores were calculated and correlation coefficients more than 0.70 were considered as acceptable reliability (50). The Kappa coefficient of the checklist was 0.967. Participants' CSs were assessed before and ten days after the study intervention (51).

Intervention
FTFE was provided in two sessions for three eight-person groups through the lecture and the question and answer methods. Sessions were held by a master's student in nursing who had received specialized CS-related education in fifty hours and had a hospital work experience of fifteen years. VE was provided using the Navid VE system of Shahrekord University of Medical Sciences, Shahrekord, Iran (https://skumsnavid.vums.ac.ir). The virtual CE program was developed using the Articulate Storyline (v. 3.0). Educational videos on CSs were prepared by a master's student based on the scenarios and loaded on the VE system. VE was provided in the computer room of the study setting. Each student used a headphone-equipped personal computer to enter the VE page of the study using a personal password and watched educational materials. Participants could scroll backward and forward and watch the different pages of the VE program. After the VE session, the passwords of participants were immediately deactivated in order to prevent the access of participants in the FTFE group to the VE materials.

Data analysis
Data were entered into the SPSS software (v. 23.0), described using mean, standard deviation, absolute frequency, and relative frequency, and analyzed using the independent-sample *t*, paired-sample *t*, and chi-

square tests as well as the multivariate analysis of variance (MANOVA). The level of significance was set at less than 0.05.

Results

Most participants in the FTFE and the VE groups were female (52.2% vs. 61.5%) and lived in Chaharmahal and Bakhtiari province, Iran (82.6% vs. 80.8%). There were no significant between-group differences respecting participants' gender and place of residence ($P > 0.05$; Table 1).

The independent-sample t test revealed no significant difference between the FTFE and the VE groups in terms of the pretest mean scores of participants' CSs (4.48–6.82 vs. 4.50–6.81; $P > 0.05$). MANOVA was used for between-group comparisons respecting the posttest mean score of CSs. The Box's M test indicated the equality of variance (Box's M = 6.264; F = 0.369; $P = 0.986$). Accordingly, the results of MANOVA revealed no significant differences between the groups respecting the posttest mean scores of communication with elderly patient, communication with adolescent patient, communication with aggressive patient, communication with illiterate or non-communicative patient, and communication for consent skills (Pillar's Trace = 0.093; F (5; 43) = 0.885; $P = 0.499$)

(Table 2).

The results of the paired-sample t test showed that the posttest total mean score of CSs in both groups were significantly greater than their corresponding pretest values ($P < 0.05$). Accordingly, MANOVA was used to compare the groups respecting the pretest-posttest mean differences of CSs. The Box's M test confirmed the equality of variance (Box's M = 26.195; F = 1.544; $P = 0.081$) and MANOVA showed no significant differences between the groups respecting the pretest-posttest mean differences of communication with elderly patient, communication with adolescent patient, communication with aggressive patient, communication with illiterate or non-communicative patient, and communication for consent skills (Pillar's trace = 0.122; F (5; 43) = 0.1.198; P = 0.326) (Table 3).

There were no significant differences between male and female students as well as between students who lived in and did not live in Chaharmahal and Bakhtiari province respecting the pretest and the posttest mean scores of CSs, except for the posttest mean score of communication with aggressive patient which was greater among female students ($P = 0.05$) and the pretest mean score of communication with elderly patient which was greater among students who did not live in Chaharmahal and

Table 1. Between-group comparisons respecting participants' gender and place of residence

Characteristics		Group		Test	P value
		FTFE (n = 23) No. (%)	VE (n = 26) No. (%)		
Gender	Male	11 (47.8)	10 (38.5)	Chi-square	0.572
	Female	12 (52.2)	16 (61.5)		
Place of residence	Native	19 (82.6)	21 (80.8)	Fisher's exact	1.000
	Non-native	4 (17.4)	5 (19.2)		

Table 2. Within- and between-group comparisons respecting participants' CSs

Skills	Time	Group		P value
		FTFE	VE	
		Mean ± SD	Mean ± SD	
Communication with elderly patient	Pretest	5.52 ± 1.50	6.23 ± 0.95	0.060[b]
	Posttest	6.91 ± 1.24	7.27 ± 1.25	0.323[c]
	P value[a]	0.000	0.001	—
Communication for consent	Pretest	5.74 ± 1.71	5.62 ± 1.30	0.775[b]
	Posttest	6.57 ± 1.08	6.38 ± 1.06	0.558[c]
	P value[a]	0.020	0.012	—
Communication with illiterate or non-communicative patient	Pretest	6.04 ± 1.33	6.38 ± 1.27	0.363[b]
	Posttest	7.13 ± 1.22	7.23 ± 1.14	0.767[c]
	P value[a]	0.000	0.013	—
Communication with adolescent patient	Pretest	6.83 ± 1.61	6.81 ± 1.10	0.963[b]
	Posttest	7.48 ± 1.24	7.88 ± 1.11	0.231[c]
	P value[a]	0.013	0.000	—
Communication with aggressive patient	Pretest	4.48 ± 1.08	4.50 ± 1.10	0.945[b]
	Posttest	6.48 ± 1.00	6.77 ± 0.65	0.197[c]
	P value[a]	0.000	0.000	—

[a] The results of the paired-sample t test; [b] The results of the independent-sample t test; [c] The results of the multivariate analysis of variance.

Bakhtiari province (*P* = 0.045) (Tables 4 and 5).

Discussion

Study findings revealed that participants had poor to moderate CSs. This is in line with the findings of two previous studies in Iran (9,52) and highlights the importance of implementing educational programs for improving nursing students' CSs.

Study findings also indicated no significant differences between the FTFE and the VE groups respecting the posttest mean scores of communication with elderly patient, communication with adolescent patient, communication with aggressive patient, communication with illiterate or non-communicative patient, and communication for consent skills. This is in line with the findings of several previous studies. For example, a three-group study on 62 nursing students in Australia into the effects of five-week home care, standardized patient, and VE showed that all three interventions similarly improved students' CSs and there was no significant difference among the groups respecting the change in the mean score

of CSs (34). Moreover, a study on 72 bachelor's students in medical sciences in Columbia University showed no significant difference between nine-week FTFE and VE respecting the mean score of English language skills (38). Similarly, a study reported the similar effectiveness of a two-hour virtual workshop and six-hour FTFE in enhancing implementation science proposals among 72 researchers (36). Another study in Australia showed no significant difference between the effects of FTFE and VE on psychological skills among 72 psychology students (35). A study in Canada also found no significant difference between the effects of 45-minute simulation-based FTFE and 45-minute simulation-based VE on knowledge, self-confidence, and anxiety among 56 nursing students attending a maternity nursing course (37).

Contrary to our findings, a study in the United States on 1054 students in the VE group and 5193 students in the FTFE group reported the greater effectiveness of VE in improving the outcomes of learning in the physical science course (24). Another study into the effects of five 2-hour lectures among 219 first-year dental students reported the better learning outcomes of FTFE (41). Moreover, a study found that FTFE was more effective than VE in improving mathematic knowledge among 130 engineering students in Germany (42). Another study on eighty paramedic technicians found that the effects of FTFE on practical skills were significantly more than the effects of VE, while there was no significant difference between their effects on theoretical knowledge (39).

In VE, instructors have limited contact with learners and learners are mostly affected by educational materials rather than instructors. Therefore, educational materials should be developed with high precision and quality

Table 3. Pretest-posttest mean differences of CSs in both groups

	Groups	
Skills	**FTFE**	**VE**
	Mean ± SD	Mean ± SD
Communication with elderly patient	1.39 ± 1.16	1.04 ± 1.34
Communication for consent	0.83 ± 1.59	0.77 ± 1.45
Communication with illiterate or non-communicative patient	1.16 ± 1.09	1.62 ± 0.85
Communication with adolescent patient	0.15 ± 0.651	1.20 ± 1.08
Communication with aggressive patient	1.09 ± 2.00	1.08 ± 2.27

Table 4. Comparisons of male and female participants respecting the mean scores of CSs

	Time and group					
Skills	**Pretest (Mean ± SD)**			**Posttest (Mean ± SD)**		
	Male	**Female**	**P value[a]**	**Male**	**Female**	**P value[a]**
Communication with elderly patient	5.67 ± 1.56	6.07 ± 1.02	0.308	6.76 ± 1.26	7.36 ± 1.19	0.098
Communication for consent	1.75 ± 5.19	1.17 ± 6.04	0.064	1.08 ± 6.19	1.02 ± 6.68	0.112
Communication with illiterate or non-communicative patient	1.39 ± 6.14	1.24 ± 6.29	0.707	1.07 ± 7.05	1.24 ± 7.29	0.485
Communication with adolescent patient	1.66 ± 6.62	1.07 ± 6.96	0.411	1.24 ± 7.67	1.15 ± 7.71	0.890
Communication with aggressive patient	0.93 ± 4.48	1.20 ± 4.50	0.940	0.86 ± 6.38	0.67 ± 6.82	**0.050**

[a] The independent sample *t* test.

Table 5. Comparisons of native and non-native participants respecting the mean scores of CSs

	Time and group					
Skills	**Pretest (Mean ± SD)**			**Posttest (Mean ± SD)**		
	Non-native	**Native**	**P value[a]**	**Non-native**	**Native**	**P value[a]**
Communication with elderly patient	6.67 ± 0.87	5.73 ± 1.30	0.045	7.56 ± 0.53	7.00 ± 1.34	0.052
Communication for consent	6.33 ± 1.41	5.53 ± 1048	0.144	6.44 ± 0.73	6.48 ± 1.13	0.939
Communication with illiterate or non-communicative patient	6.78 ± 1.20	6.10 ± 1.30	0.158	7.78 ± 0.97	7.05 ± 1.18	0.091
Communication with adolescent patient	7.33 ± 1.12	6.70 ± 1.38	0.206	8.56 ± 0.88	7.50 ± 1.15	0.013
Communication with aggressive patient	5.11 ± 0.93	4.35 ± 108	0.056	6.78 ± 0.44	6.60 ± 0.84	0.544

[a] The independent sample *t* test.

(53,54). It is noteworthy that providing learners with high amount of educational materials on a personal or university website cannot be considered VE at all. Rather, instructors need to use different software and hardware devices, have adequate skills for their use, have great interest in VE, and allocate adequate time to produce quality educational materials to improve the outcomes of VE (55). Educational materials for VE in the present study were developed using the Articulate Storyline and as multimedia modules containing educational videos. Moreover, students could scroll backward and forward and watch the different pages of the VE program. These options might have contributed to the similar effects of VE and FTFE in the present study.

We also found that the mean scores of CSs significantly increased in both FTFE and VE groups. Several previous studies reported the same finding. For example, a three-group study in Australia (34), a study with a four-day educational workshop intervention in the United States (56), and a study with a one-hour educational intervention and an educational file (57) found the significant positive effects of education on CSs. However, some studies reported that educational interventions had no significant positive effects on CSs. For example, a study in Ghana found that two-day CS education had no significant effects on midwifery students' CSs and attributed this finding to the limited opportunity for students' reflection on educational materials (58). Another study in Switzerland reported the same finding and attributed it to the short-course of education and evaluation through open-ended questions rather than checklists (59). Similarly, a study found that simulation-based education did not significantly improve CSs (60). Such contradiction can be due to the differences among studies respecting the types of education and evaluation. A study highlighted that CS educational programs should integrate audio materials, simulated scenarios, and opportunities to practice CSs (61).

Our findings also revealed that the mean scores of the communication with elderly patient, communication with illiterate or non-communicative patient, and communication for consent skills in the FTFE group were slightly greater than the VE group, while the mean scores of the communication with adolescent patient and the communication with aggressive patient skills in the VE group were slightly greater than the FTFE group. These findings imply that the combination of FTFE and VE can produce greater effects on CSs. Two studies found that combining educational strategies can produce better results (62,63). Therefore, replication of the present study with a combined FTFE-VE group is recommended.

Conclusion

This study concludes that nursing students have poor to moderate CSs, highlighting the importance of quality education for improving their CSs. Moreover, this study shows that VE is as effective as FTFE in significantly

What does this paper contribute to the wider global clinical community?

- Nursing students have poor to moderate CSs.
- Virtual education is as effective as face-to-face education in significantly improving nursing students' CSs.
- Quality educational programs are needed to improve nursing students' CSs.

improving nursing students' CSs. Therefore, quality VE programs are recommended to fulfill the different educational needs of nursing students.

Conflict of Interest
One of the authors of the article (Reza Masoudi) is the "Editor-in-chief" of the journal. Based on the journal policy, this author was completely excluded from any review process of this article and the review process of this article.

Ethical Approval
This study was part of a master's thesis in Medical-Surgical Nursing approved by the Ethics Committee of Shahrekord University of Medical Sciences,, Shahrekord, Iran (code: IR.SKUMS.REC.1398.115).

References
1. Fayyaz I, Karimi M. Investigation into interpersonal commuicative skills in innocents (peace be Upon Him) way. J Isalmic Education. 2010;5(10):7-28. [Persian].
2. Kourkouta L, Papathanasiou IV. Communication in nursing practice. Mater Sociomed. 2014;26(1):65-7. doi: 10.5455/msm.2014.26.65-67.
3. Barilaro A, Conidi A, Ligarò S, Licata F, Marinaro MA, Ventura S, et al. Nursing communication as a tool for patient satisfaction. A single hospital survey. Open Nurs J. 2019;13(1):220-7. doi: 10.2174/1874434601913010220.
4. Paladino J, Bernacki R, Neville BA, Kavanagh J, Miranda SP, Palmor M, et al. Evaluating an intervention to improve communication between oncology clinicians and patients with life-limiting cancer: a cluster randomized clinical trial of the serious illness care program. JAMA Oncol. 2019;5(6):801-9. doi: 10.1001/jamaoncol.2019.0292.
5. Xie J, Ding S, Wang C, Liu A. An evaluation of nursing students' communication ability during practical clinical training. Nurse Educ Today. 2013;33(8):823-7. doi: 10.1016/j.nedt.2012.02.011.
6. Włoszczak-Szubzda A, Jarosz MJ. Professional communication competences of nurses -- a review of current practice and educational problems. Ann Agric Environ Med. 2013;20(1):183-8.
7. Bello O. Effective Communication in Nursing Practice: A Literature Review. Bachelor's Thesis. 2017. p. 6-54.
8. Kwame A, Petrucka PM. Communication in nurse-patient interaction in healthcare settings in sub-Saharan Africa: a scoping review. Int J Afr Nurs Sci. 2020;12:100198. doi: 10.1016/j.ijans.2020.100198.

9. Mirzaei- Alavijeh M, Motlagh M, Hosseini S, Jalilian F. Nursing students communication skills with patients in Kermanshah University of Medical Sciences. Res Med Educa2017;9(3):47-54. doi: 10.29252/rme.9.3.54. [Persian].

10. Shafakhah M, Zarshenas L, Sharif F, Sabet Sarvestani R. Evaluation of nursing students' communication abilities in clinical courses in hospitals. Glob J Health Sci. 2015;7(4):323-8. doi: 10.5539/gjhs.v7n4p323.

11. Kashani F, Moghimian M, Salarvand S, Kashani P. Nurses' knowledge, attitude, practice about effective communication skills in patient education. J Res Dev Nurs Midwifery. 2015;12(2):59-67. [Persian].

12. Gholami HR, Sarhangi F, Mokhtari Nouri J, Javadi M. Nurses' communication skills in military hospitals. J Nurs Midwifery Sci. 2015;2(1):40-5. doi: 10.7508/jnms.2015.01.006. [Persian].

13. Bramhall E. Effective communication skills in nursing practice. Nurs Stand. 2014;29(14):53-9. doi: 10.7748/ns.29.14.53. e9355.

14. Baghcheghi N, Koohestani HR, Rezaei K. A comparison of the cooperative learning and traditional learning methods in theory classes on nursing students' communication skill with patients at clinical settings. Nurse Educ Today. 2011;31(8):877-82. doi: 10.1016/j.nedt.2011.01.006.

15. Mirhaghjou SN, Nayebi N, Majd Teymouri R, Kazemnejad Leily E. Communication skills and related factors within patient by nursing student. J Holist Nurs Midwifery. 2015;25(2):93-101. [Persian].

16. Malloy P, Virani R, Kelly K, Munévar C. Beyond bad news: communication skills of nurses in palliative care. J Hosp Palliat Nurs. 2010;12(3):166-74. doi: 10.1097/NJH.0b013e3181d99fee.

17. Lau Y, Wang W. Development and evaluation of a learner-centered training course on communication skills for baccalaureate nursing students. Nurse Educ Today. 2013;33(12):1617-23. doi: 10.1016/j.nedt.2013.02.005.

18. Claramita M, Tuah R, Riskione P, Prabandari YS, Effendy C. Comparison of communication skills between trained and untrained students using a culturally sensitive nurse-client communication guideline in Indonesia. Nurse Educ Today. 2016;36:236-41. doi: 10.1016/j.nedt.2015.10.022.

19. Kounenou K, Aikaterini K, Georgia K. Nurses' communication skills: exploring their relationship with demographic variables and job satisfaction in a Greek sample. Procedia Soc Behav Sci. 2011;30:2230-4. doi: 10.1016/j.sbspro.2011.10.435.

20. Dithole KS, Thupayagale-Tshweneagae G, Akpor OA, Moleki MM. Communication skills intervention: promoting effective communication between nurses and mechanically ventilated patients. BMC Nurs. 2017;16:74. doi: 10.1186/s12912-017-0268-5.

21. Falahi M, Zaraii Zavaraki E, Nourozi D. Comparison of social skills of students in in-person training and online system. Technol Educ J. 2018;12(4):317-27. doi: 10.22061/jte.2018.2459.1629.

22. Graham A. Benefits of online teaching for face-to-face teaching at historically black colleges and universities. Online Learn. 2019;23(1):144-63.

23. Khazaei M. The theoretical methods of medical training after Islam and compare it with new methods of teaching. Journal of Medicine and Cultivation. 2016;25(1):49-56. [Persian].

24. Mozer LF. A Comparison of Online and Face-to-Face Achievement in Physical Science. Presented in: Partial Fulfillment of the Requirements for the Degree of Doctor of Education. Kennesaw State University; 2016. p. 1-113.

25. Sankar L, Sankar CS. Comparing the Effectiveness of Face-to-Face and Online Training on Teacher Knowledge and Confidence. Proceedings of Informing Science & IT Education Conference (InSITE); 2010.

26. Eslami K, Kouti L, Noori A. Different methods of medical sciences virtual education in Iran and assessment of their efficacy; a review article. Educ Dev Judishapur. 2016;7(2):128-37. [Persian].

27. Granville AD. Construction of 3D Cardiopulmonary Resuscitation Emergency Scenarios for First Responder Pre-Nursing Training on Stereoscopic Display Systems. The University of Alabama at Birmingham; 2014.

28. Bujdosó Z, Busa Z, Futó Z, Mucsics LF. Handbook on the Effective Use of Virtual Learning Platform and ICT Tools for Online Courses. Eszterházy Károly University; 2016.

29. Stern J. Introduction to online teaching and learning. Int J Sci Educ. 2018;3(1):1-10.

30. Diab GM, Elgahsh NF. E-learning during COVID-19 pandemic: obstacles faced nursing students and its effect on their attitudes while applying it. Am J Nurs. 2020;9(4):300-14.

31. Alkhowailed MS, Rasheed Z, Shariq A, Elzainy A, El Sadik A, Alkhamiss A, et al. Digitalization plan in medical education during COVID-19 lockdown. Inform Med Unlocked. 2020;20:100432. doi: 10.1016/j.imu.2020.100432.

32. Subedi S, Nayaju S, Subedi S, Shah SK, Shah JM. Impact of E-learning during COVID-19 pandemic among nursing students and teachers of Nepal. Int J Sci Healthc Res. 2020;5(3):68-76.

33. Edelhauser E, Lupu-Dima L. Is Romania prepared for eLearning during the COVID-19 pandemic? Sustainability. 2020;12(13):5438. doi: 10.3390/su12135438.

34. Quail M, Brundage SB, Spitalnick J, Allen PJ, Beilby J. Student self-reported communication skills, knowledge and confidence across standardised patient, virtual and traditional clinical learning environments. BMC Med Educ. 2016;16:73. doi: 10.1186/s12909-016-0577-5.

35. Kemp N, Grieve R. Face-to-face or face-to-screen? Undergraduates' opinions and test performance in classroom vs. online learning. Front Psychol. 2014;5:1278. doi: 10.3389/fpsyg.2014.01278.

36. Marriott BR, Rodriguez AL, Landes SJ, Lewis CC, Comtois KA. A methodology for enhancing implementation science proposals: comparison of face-to-face versus virtual workshops. Implement Sci. 2016;11:62. doi: 10.1186/s13012-016-0429-z.

37. Cobbett S, Snelgrove-Clarke E. Virtual versus face-to-face clinical simulation in relation to student knowledge, anxiety, and self-confidence in maternal-newborn nursing: a randomized controlled trial. Nurse Educ Today. 2016;45:179-84. doi: 10.1016/j.nedt.2016.08.004.

38. Montiel-Chamorro ML. Comparing Online English Language Learning and Face-to-Face English Language Learning at El Bosque University in Colombia [dissertation]. Virginia Commonwealth University; 2018.

39. Aminizadeh M, Saberinia A, Kohan S, Shokohi I, Faghihi A, Aminizadeh E. Evaluation and comparison of electronic learning and traditional education methods in terms of practical skills of parametric technicians in prehospital emergency care. Stride Dev Med Educ. 2015;12(2):388-98.

40. Lu F, Lemonde M. A comparison of online versus face-to-face teaching delivery in statistics instruction for undergraduate health science students. Adv Health Sci Educ Theory Pract. 2013;18(5):963-73. doi: 10.1007/s10459-012-9435-3.

41. Kunin M, Julliard KN, Rodriguez TE. Comparing face-to-face, synchronous, and asynchronous learning: postgraduate dental resident preferences. J Dent Educ. 2014;78(6):856-66.

42. Dondorf T, Breuer R, Nacken H. Classroom Vs. E-Learning: A Case Study on the Performance of Student in Different Learning Scenarios. Barcelona, Spain: International Conference on Education and New Learning Technologies (EDULEARN); 2016.

43. Ortega P, Park YS, Girotti JA. Evaluation of a medical spanish

elective for senior medical students: improving outcomes through OSCE assessments. Med Sci Educ. 2017;27(2):329-37. doi: 10.1007/s40670-017-0405-5.

44. Graf J, Smolka R, Simoes E, Zipfel S, Junne F, Holderried F, et al. Communication skills of medical students during the OSCE: gender-specific differences in a longitudinal trend study. BMC Med Educ. 2017;17(1):75. doi: 10.1186/s12909-017-0913-4.

45. Ebadi A, Yousefi Goshtasb S, Khaghanizadeh M, Hosseini SMJ, Raeisifar A, Masoumi M, et al. Comparison the effect of conventional and distance training on nurses' clinical skills. J Mil Med. 2010;12(2):71-4. [Persian].

46. Chan J, Humphrey-Murto S, Pugh DM, Su C, Wood T. The objective structured clinical examination: can physician-examiners participate from a distance? Med Educ. 2014;48(4):441-50. doi: 10.1111/medu.12326.

47. Sheikh Abumasoudi R, Moghimian M, Hashemi M, Kashani F, Karimi T, Atashi V, et al. Comparison the effect of objective structured clinical evaluation (OSCE) with direct and indirect supervision on nursing student's test anxiety. J Nurs Educ. 2015;4(2):1-8. [Persian].

48. Monazam M, Laal F, Sarsangi V, Fallahmadvari R, Najafi K, Fallahmadvari A. Designing and determination of validity and reliability of the questionnaire increasing the duration of using the hearing protection device by workers based on BASNEF model. J Ilam Univ Med Sci. 2018;25(6):21-8. doi: 10.29252/sjimu.25.6.21. [Persian].

49. Mohtashami J, Salsali M, Pazargadi M, Manoochehri H, Alavi Majd H. Developing and psychometric properties check list of clinical competency in mental health nursing students. J Nurs Educ. 2014;2(3):46-57. [Persian].

50. Mohammadbeigi A, Mohammadsalehi N, Aligol M. Validity and reliability of the instruments and types of measurments in health applied researches. J Rafsanjan Univ Med Sci. 2015;13(12):1153-70. [Persian].

51. Fayand J, Akbari M, Moradi O, Karimi K. The effectiveness of emotional self-regulatory model on improving the quality of life in multiple sclerosis patients. J Health Care. 2019;20(4):301-11. doi: 10.29252/jhc.20.4.301. [Persian].

52. Namazi A, Homauonfar H. Assessment of interpersonal communication skills and related factors in nursing and midwifery students. Journal of Health Based Research. 2017;2(4):369-80. [Persian].

53. Elahyan Firooz S, Khazaei K. Extent of using the components of e-learning criteria in the educational content of virtua. J Information and Communication Technology in Educational Science. 2010;2(2):143-62. [Persian].

54. Moradi R, Mohamadi Mehr M, Nojoomi F, Khazaie A. The use of design patterns in the design and production of electronic content in e-learning environment. J Educ Stud. 2016;4(1):41-52. [Persian].

55. Sarafi A. Najarian S. Generating standard content in e-learning is an essential need. J Journal of Developmental Steps in Medical Sciences. 2008;5(2):152-4. [Persian].

56. Bays AM, Engelberg RA, Back AL, Ford DW, Downey L, Shannon SE, et al. Interprofessional communication skills training for serious illness: evaluation of a small-group, simulated patient intervention. J Palliat Med. 2014;17(2):159-66. doi: 10.1089/jpm.2013.0318.

57. Tulsky JA, Arnold RM, Alexander SC, Olsen MK, Jeffreys AS, Rodriguez KL, et al. Enhancing communication between oncologists and patients with a computer-based training program: a randomized trial. Ann Intern Med. 2011;155(9):593-601. doi: 10.7326/0003-4819-155-9-201111010-00007.

58. Alhassan M. Effect of a 2-day communication skills training on nursing and midwifery students' empathy: a randomised controlled trial. BMJ Open. 2019;9(3):e023666. doi: 10.1136/bmjopen-2018-023666.

59. Junod Perron N, Nendaz M, Louis-Simonet M, Sommer J, Gut A, Cerutti B, et al. Impact of postgraduate training on communication skills teaching: a controlled study. BMC Med Educ. 2014;14:80. doi: 10.1186/1472-6920-14-80.

60. Curtis JR, Back AL, Ford DW, Downey L, Shannon SE, Doorenbos AZ, et al. Effect of communication skills training for residents and nurse practitioners on quality of communication with patients with serious illness: a randomized trial. Jama. 2013;310(21):2271-81. doi: 10.1001/jama.2013.282081.

61. Back AL, Fromme EK, Meier DE. Training clinicians with communication skills needed to match medical treatments to patient values. J Am Geriatr Soc. 2019;67(S2):S435-S41. doi: 10.1111/jgs.15709.

62. Khoshnoodi Far M, Arabnezhad Z, Tehrani H, Akbari Farmad S. The effect Blended training on comparison with in-person training on self-care behaviors in type 2 diabetes patients. Iran J Health Educ Health Promot. 2019;7(4):333-42. doi: 10.29252/ijhehp.7.4.333.

63. Rohi M, Jahanian I, Gholinai H, Abbas Zadeh H. A comparison of traditional learning and combined traditional-elearning (web-based) on dentistry students' learning of practical oral pathology course. J Med Educ Dev. 2016;9(21):47-52. [Persian].