Improving Nursing Students' Learning Outcomes in Fundamentals of Nursing Course through Combination of Traditional and e-Learning Methods

Abstract

Background: Fundamentals of nursing course are prerequisite to providing comprehensive nursing care. Despite development of technology on nursing education, effectiveness of using e-learning methods in fundamentals of nursing course is unclear in clinical skills laboratory for nursing students. The aim of this study was to compare the effect of blended learning (combining e-learning with traditional learning methods) with traditional learning alone on nursing students' scores. **Materials and Methods:** A two-group post-test experimental study was administered from February 2014 to February 2015. Two groups of nursing students who were taking the fundamentals of nursing course in Iran were compared. Sixty nursing students were selected as control group (just traditional learning methods) and experimental group (combining e-learning with traditional learning methods) for two consecutive semesters. Both groups participated in Objective Structured Clinical Examination (OSCE) and were evaluated in the same way using a prepared checklist and questionnaire of satisfaction. Statistical analysis was conducted through SPSS software version 16. **Results:** Findings of this study reflected that mean of midterm (t = 2.00, p = 0.04) and final score (t = 2.50, p = 0.01) of the intervention group (combining e-learning with traditional learning methods) were significantly higher than the control group (traditional learning methods). The satisfaction of male students in intervention group was higher than in females (t = 2.60, p = 0.01). **Conclusions:** Based on the findings, this study suggests that the use of combining traditional learning methods with e-learning methods such as applying educational website and interactive online resources for fundamentals of nursing course instruction can be an effective supplement for improving nursing students' clinical skills.

Keywords: *Blended learning, e-learning, fundamentals of nursing course, Iran, nursing student*

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Introduction

Nursing students need to have the ability of applying nursing fundamentals and skills in taking care of the patients. The first course in which the students learn how to apply their nursing skills in care is fundamentals of nursing.[1] In this course, one of the most important learning needs is training of psychomotor skills that is done in the field of clinical skills lab.[2] Meanwhile, the students, especially in primary semesters, are in primary level of psychomotor skills. Hence, considerable time is allocated for attending the skills lab in this course.[3] In this regard, using approaches leading to more students' involvement in learning process can facilitate presentation of the course content in students' education.[4] One of these strategies is using technology in education. Potential capability of e-learning using new and flexible approaches has internationally been known in nursing training.[5,6] In this kind of training, educational content is made more faster, more effective, and more economic,[7] and important principles such as students' activity, individuals' learning, fast reaction, repeating educational content in proportion to individuals' needs and requests, developing independence skill, flexibility, organizing, setting speed of learning and practicing computer skills are realized.[8] In addition, focus is shifted from teaching to learning, and as a result, learning will be deeper and more permanent.[9] It could occur with improving nursing education programs to facilitate positive experiences of the students.[10] E-learning is used not only for changing learning and training methods but

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also as one of the complementary methods in traditional training. By applying e-learning, different methods of training can be used, distance learning would be possible, time and cost are saved and sharing information would be possible for the students,[11] and consequently, students' motivation, satisfaction and pleasure are increased.[12]

In multiple studies, both traditional and e-learning have been reported effective and valuable in nursing education.[13-15] A number of studies have also suggested combination of both methods in education.[16-18] E-learning is presented in different formats such as reading, watching and listening to materials or combination of these formats. The important factor in designing an educational program is making learning simple and efficient. High quality can provide opportunities for professional e-learning so that individuals are provided with new options for accessing the best curriculums.[19]

With regard to nursing curriculums, complete learning of clinical skills is one of the necessary priorities for nursing students because it guarantees the secure care of the patients. Therefore, the most efficient methods of training skills must be used for students to become professional and to maximize their learning.[20] Although use of traditional face-to-face training methods, used in the laboratory of clinical skills, is considered as an invaluable strategy in nursing education,[21] training skills must be based on students' learning needs, expectations and learning styles.[22] It means that students' speed of learning must be considered, and training strategies should be used in proportion to their priorities and interests to make more efficient learning possible.[23] E-learning can complete face-to-face traditional training leading to maximized comprehensiveness of learning through different approaches.[24] Moreover, students can control and manage process of their learning.[25] This is a reliable method for training clinical skills that causes boosting confidence, reducing stress, and increasing self-awareness and self-evaluation.[26] Despite development of technology on nursing education, effectiveness of using e-learning methods in fundamentals of nursing course in clinical skills laboratory is unclear. The aim of this study was to compare the effect of blended learning combining e-learning with traditional learning methods with traditional learning alone on nursing student's scores and satisfaction.

Materials and Methods

A two-group post-test experimental study was administered. After attaining permission from research ethic committee of Isfahan University of Medical Sciences, sampling was conducted in Nursing and Midwifery Faculty affiliated to Isfahan University of Medical Sciences within February 2015 to February 2016. In this study, all freshmen nursing students who were learning nursing clinical skills course (without any experience in learning nursing clinical skills) were selected. In the present study, sample size was equal

to community size, and totally, 60 nursing students were selected as control group (traditional learning methods) and as experimental group (combining e-learning with traditional learning methods) for two consecutive semesters. In control group, students were divided into 10 individual groups, and psychomotor skills in fundamentals of nursing course (hygiene needs, vital signs, enteral feeding, O2 therapy, suction of respiratory tract, stoma care, wound care, catheterization, enema, injections) were taught in two-hour sessions twice a week in the laboratory of clinical skills from February to June. In the experimental group, the traditional method was used in combination with e-learning; therefore, when students had traditional training of clinical skills in two-hour sessions twice a week in the laboratory of clinical skills from September to February, they received address of Uniform Resource Locator (URL) to use the designed educational website. In the present study, address of URL was *nursingskills.ir* with Plan A-G-3GB (the space on the internet was used to host our website). Because the control group had been evaluated in the previous semester, the experimental group could use the site without the need for a username and password. This site consisted of text file of running nursing procedures step-by-step with scanned pictures of the newest references as well as relevant video clips (educational films) of nursing procedures. Students had access to materials and educational films on computer or mobile device easily and could download text files with relevant pictures and films and use them when they did not have access to network. Therefore, training continued whenever and wherever students wanted. Role of researchers in e-learning was to manage site, prepare educational materials, make material available on Internet, answer to questions of the participants, and finally conduct exams.

Two groups participated in Objective Structured Clinical Examination (OSCE) in 3 stations with a 10-minute time limit for any station in unit midterm and final term and were evaluated in the same way using a prepared checklist with 15–20 statements for any procedure. Their mean scores were compared with each other. The checklist was confirmed in terms of content and face validity by faculty members of adults health nursing group. Moreover, students' satisfaction with e-learning was evaluated by a researcher-made questionnaire based on a 5-point Likert's scale of 25 expressions. Options of strongly satisfied, satisfied, approximately satisfied, unsatisfied and strongly unsatisfied received scores of 5, 4, 3, 2, and 1, respectively, (minimum and maximum score were 25 and 125), and score of satisfaction was calculated. Satisfaction questionnaires were completed after the final exam in a classroom by the skills lab. To make sure of content validity of the prepared checklist and questionnaire of satisfaction, 10 professors of adult health nursing were offered to pass their corrections. Moreover, equivalence method and Cronbach's alpha were used

for examining reliability of the prepared checklist and reliability of the questionnaire of satisfaction respectively. A reliability coefficient of 0.86 indicated the reliability of the research tool.

Statistical analysis was conducted by the SPSS software (version 16, SPSS Inc., Chicago, IL, USA). One-Sample Kolmogorov-Smirnov Test showed that data had been normally distributed (p = 0.378 for control group and p = 0.787 for experimental group). t-test was used to compare mean scores of training nursing clinical skills to the students in two groups and comparing mean scores of male and female students' satisfaction.

Ethical considerations

All students were given verbal and written information about the purpose and importance of the study. A written and informed consent was obtained from the students, and they were free to withdraw from the study at any time. This study was approved by the Ethics Committee of Isfahan University of Medical Sciences.

Results

In traditional training group and experimental group, total number of 60 individuals (26 males and 34 females) and 59 individuals (29 males and 33 females) were recruited respectively. Further participants' demographic characteristics have been presented in Table 1. Mid-term mean (SD) score of training nursing clinical skills unit in the traditional training group with e-learning was 18 (1.10), and mean (SD) score in the traditional training method was 17.50 (1.70). T-test indicated that two groups were different (p = 0.04). Final-term mean score of training nursing clinical skills unit in combined training method was 17.60 (1.14), and mean (SD) score of traditional training method was 16.90 (1.70). T-test was significant (p = 0.01). Total mean (SD) score of unit of practical nursing principles and techniques of nursing students in combined training method was 18.00 (0.80), while the mean score in traditional training method was 17.60 (1.25). T-test was significant (p = 0.01) [Table 2].

Comparing mean scores of male and female students' satisfaction with e-learning reflected that mean (SD) score of satisfaction in male students was 100.10 (13.80), while it was 90.40 (11.50) in female students. Its maximum score was 119 with mean score of 90. t-test showed a significant difference between mean scores of satisfaction in two groups of male and female students, p = 0.01 [Table 3].

Discussion

Fundamentals of nursing course teach the basic principles and procedures of nursing in undergraduate nursing students. This course is significant for knowing fundamental needs of humans. Competence in fundamental skills is a prerequisite to provide extensive

nursing care for the nursing students. The laboratory of clinical skills for learning psychomotor skills in this course is a necessary structure in nursing training that can assure nursing students' achievement to sufficient training and makes them ready for real clinical settings that must be prepared through appropriate training strategies. Primary strategies for training nursing clinical skills are consisted of using simulators from low to high precision.[27] Findings of the present study showed that combination of e-learning with traditional face-to-face teaching methods could improve learning outcomes in nursing students. Abdolaziz *et al.* (2011) also reported that post-test score of study group or training through e-learning was significantly higher, compared with that of control group with traditional training method. [28] Bloomfield *et al.* (2010) reported score of skill performance in computer-aid training was higher than traditional group during an 8-week follow-up showing

Table 1: Demographic characteristics of the intervention (*n*=59) and control group (*n*=60)

Variable	Intervention group *n* (%)	Control group *n* (%)
Sex		
Men	29 (49.15%)	26 (43.33%)
Women	33 (50.85%)	33 (55.00%)
Age (year)		
18-20	50 (84.74%)	50 (83.33%)
21-25	4 (6.77%)	6 (10.00%)
26-30	5 (8.47%)	4 (6.66%)
Matriculation quota		
Region 1	21 (35.59%)	26 (43.33%)
Region 2	28 (47.45%)	26 (43.33%)
Other than that	10 (16.94%)	8 (13.33%)
Place of residence		
City	18 (30.50%)	19 (31.66%)
County	34 (57.62%)	34 (56.66%)
Village	7 (11.86%)	7 (11.66%)

Table 2: Comparison of nursing students' mean scores in both intervention and control groups

Variable	Mean (SD)		Independent *t*-test		
	Intervention group	Control group	*t*	df	*p*
Mid-term score	17.50 (1.70)	16.90 (1.70)	2.00	117	0.04
Final-term score	18 (1.08)	17.60 (1.14)	2.50	117	0.01
Total score	18.00 (0.83)	17.60 (1.25)	2.40	117	0.01

Table 3: Mean scores of male and female students' satisfaction in intervention group

Variable	Mean (SD)		Independent *t*-test		
	Male	Female	*t*	df	*p*
Satisfaction score	100.10 (13.80)	90.40 (11.50)	2.60	43	0.01

that stability of learning in computer-aid training was more than traditional in spite of the efficiency of two methods of learning.[13] But, Rieme *et al*. (2008) reported that total test score was higher in lecture group.[29] On the other hand, results of Stanton *et al*. (2012) reported that two groups of e-learning and traditional training had no significant difference in term of test score.[30] In addition, Lathi *et al*. (2014) systematic review from 11 experimental studies reported no statistical significant difference between two groups of e-learning and traditional learning in term of knowledge, skill, and satisfaction.[31,32] It should be noted that all aforementioned studies used either mere e-learning or traditional methods or compared them.

Meanwhile, Al-Qahtani and Higgins's study (2013) showed a statistically significant difference between the three methods in terms of students' achievement to appropriate blended learning method. They also reported that there was no significant difference between the e-learning and traditional learning groups.[32] Bloomfield and Jones (2013) reported that students considered e-learning as an invaluable experience for developing nursing clinical skills. Although they had a positive view about e-learning, they were reluctant to abandon traditional training and considered face-to-face learning opportunities very invaluable. They preferred combined training method with e-learning.[22] Sung and Kown (2008) indicated that combination of electronic training with face-to-face training could be useful[16] also Ariana *et al*. (2016) indicated that combining e-learning with traditional learning methods of lectures and tutorials could improve students' scores and satisfaction, compared to those who experienced traditional learning alone.[17] It is consistent with the results of the present study on applying traditional and e-learning simultaneously in training nursing clinical skills with a complementary role, compared with that of the traditional method solely. It should be noted that although learning through traditional method is much valuable in education of fundamental skills, the role of e-learning as a component in combination with traditional method can bring about more advantages and be effective on enhancement of students' knowledge level.

The results of the present study showed that nursing students were satisfied with combination of e-learning and traditional methods, which is consistent with the results of Ariana *et al*. (2016) who reported satisfaction of students with combinational learning methods.[17] Comparing mean scores of male and female students' satisfaction with e-learning showed that mean score of satisfaction in male students was significantly more than female students. In this direction, Rieme and colleagues (2008) reported that male students' mean score was higher in e-learning group while female students achieved higher score in lecture group, compared to males, but no significant difference was observed. They also noted that male students were interested in technology and could gain considerable competence in it. While female students paid more attention to care and because of that, they got involved in technology less than the male students.[29]

Although applying e-learning method is considered an invaluable experience that can be used as a source like lecture, it may make limitations for some students, For example, for the students who have no access to computer and internet in dormitory or at home, having any time access to curriculum is impossible. Moreover, students, settled in dormitory, cannot watch the relevant videos for several times because of time and cost problems.

The limitation of the present study was using blended learning (combination of traditional and e-learning method) through which studying the effect of pure e-learning on students' learning outcomes was impossible.

Conclusion

Overall, learning clinical skills is a sophisticated process, and it is necessary to consider students' learning styles and priorities while being prepared for training clinical skills. As e-learning gets learners involved in the learning process and facilitates learning and self-guidance, continual presentation of educational materials can increase students' motivation, satisfaction and pleasure and complete other methods. Based on the results of above-mentioned studies in addition to the results of the present study, applying e-learning with traditional training is recommended for training nursing clinical skills. It is among the responsibilities of nursing trainers not to restrict training to class. This study revealed that the students who experienced combining e-learning with traditional learning methods had a better achievement to the fundamentals of nursing course and were more engaged, compared to those who experienced only the traditional methods.

Conflicts of interest

Nothing to declare.

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