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JOURNAL INFORMATION

AIM AND SCOPE

The aim of publishing Strides in Development of Medical Education is to promote the quality of the medical education and inform via publishing the conducted researches in all topics related to medical education. Such topics may include modern teaching methods, designing educational courses, evaluating the success rate of these courses, planning in medical sciences education based on the society's needs, and planning, management, and assessment of education. However, the Journal of Strides in Development of Medical Education welcomes any subjects causing a communication between the faculties and professors of the medical sciences and medical experts.

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This journal publishes original, review, editorial, letter to the editor, short communication articles, all related to the journal goals.

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- **Discussion:** This should emphasize the present findings and their differences or similarities with other work done in the field by other workers. Emphasize the new and important aspects of the study and the conclusions.
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"Recent randomized controlled trials in primary care showed benefits for patients with depression from increased telephone support, better cooperation between primary care and mental health professionals, and more systematic follow up (7)."

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Each author's surname followed by the initials (in the same order as they appear on the title page), a comma should separate each author's name. Title of the book. Edition of the book if there has been more than one. Place of publication or town of origin followed by a colon, Publisher's name, followed by a semi-colon, Year of publication. e.g.

Ford MJ, Munro JF. Introduction to Clinical Examination. 7th ed. Edinburgh: Churchill Livingstone; 2000.

If only a part is cited, add the page numbers, and volume number in the case of multi-volume works, at the end of the reference.

Meltzer PS, Kallioniemi A, Trent JM. Chromosome Alterations in Human Solid Tumors. In: Vogelstein B, Kinzler KW, editors. The Genetic Basis of Human Cancer. New York: McGraw-Hill; 2002. p. 93-113.

If you need to reference a book written by more than six authors, list the first six authors' names followed by "et al" thus:

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Meydani SN, Leka LS, Fine BC, Dallal GE, Keusch GT, Singh MF, et al. Vitamin E and Respiratory Tract Iinfections in Elderly Nursing Home Residents: a Randomized Controlled Trial. JAMA. 2004 Aug 18;292(7):828-36.

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Royal College of General Practitioners. The Primary Health Care Team. RCGP website 2003 [cited 2004 Sep 22]; Available from: URL: http://www.rcgp.org.uk/information/publications/information/PDFInfo/21_OCT_03.pdf

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- **Results:** Address the major findings of the review of the clinical issue or topic in an evidence-based, objective, and balanced fashion, emphasizing the highest-quality evidence available.
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Reports should contain 1000 - 2000 words and should contain a structured abstract of 200 words maximum. Short reports should comprise sections of Introduction, Materials/Patients and Methods, Results, and Discussion with not more than 2 tables or figures and up to 20 references.

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Strides Dev Med Educ. 2018 December; 15(1):e64075. doi: 10.5812/sdme.64075.

Published online 2019 January 12. **Review Article**

The Role of Mastery Learning in Clinical Education: A Systematic Review

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Abstract

Context: Effective clinical skills training of medical students can guarantee a higher quality of care, diagnosis, and treatment for patients. Therefore, selection of appropriate methods of clinical education is of great significance. Mastery learning is one of the learning models in which educational progress is not dependent on time, but rather performance. In this model, the learner is constantly assessed until achieving mastery. All students can achieve the same level of learning, although the amount of time required for mastery is variable.

Objectives: The purpose of the present study was to review the literature on the effects of mastery learning on the clinical education of medical students.

Data Sources: This systematic review was conducted in English and Persian databases to evaluate articles on mastery learning in clinical education, published from 1990 to 2016. In the primary search, 503 articles were retrieved using Persian and English keywords, including "clinical teaching" and "mastery learning". After reviewing the abstracts, 50 relevant articles were selected, and, finally, 26 articles were reviewed.

Results: Based on the findings, mastery learning can improve skill mastery among students, reduce the complications of medical interventions, increase the students' self-confidence, reduce the required time for skill acquisition, increase the students' knowledge, and improve their communication skills. Also, this method of learning has been effectively applied in medicine, nursing, and occupational therapy for students and hospital staff.

Conclusions: Mastery learning is a suitable method for teaching clinical skills to students. Considering the advantages of this method, it can be used effectively to train students from different medical disciplines.

Keywords: Clinical Education, Mastery Learning, Medical Student, Systematic Review

1. Context

Mastery learning is one of the learning models in which educational progress is not dependent on time, but rather individual performance. In this method, learners are subjected to regular assessments until reaching the designated level of mastery. All students can achieve the same level of learning, although the amount of time required for mastery is variable (1).

The model of mastery learning was first established by Benjamin Bloom, James Block, and John Carroll in 1963. Bloom believed that the learner must achieve the designated level of mastery through constant practice within an amount of time, which is needed for the learner to attain the target level of mastery. The learners are constantly tested by the instructor, and as soon as they reach the desired level of mastery (80% - 90%), they can move forward to the next lesson or program. He/she criticized the relatively fixed time allocated to teaching learners with different competencies and considered it to be detrimental to the learning process (2). Accordingly, in the mastery learning model, the objectives are similar for all learners, while there is no fixed time for learning (3, 4).

Different stages of mastery learning include: establishment of educational objectives; primary assessment; appraisal of mastery level; training implementation; formative assessment; learning correction; and summative assessment. Similar to every other instructional model, mastery learning also has several disadvantages, such as being time-consuming and prioritizing poor learners, as instructors devote most of their time to these students. On the other hand, the advantages of this method include the learners' greater effort due to higher motivation, as they are certain that they can reach the level of more capable

students by allocating sufficient time to learning. In this regard, previous studies have confirmed the efficacy of this model in promoting learning in different disciplines (5). Also, its effectiveness in improving the learning of medical students has been established (6).

Considering the nature of medical sciences, student training in the clinical setting is one of the most important educational disciplines in medicine. Effective clinical education requires adoption of methods, which can enhance the students' knowledge and performance (7). Mastery learning is one of the models, which can be used for clinical training of students to improve the process of learning. Nevertheless, there are few studies about the application of mastery learning at universities, especially in the field of medical sciences.

Previous studies in medical fields have mostly concentrated on the effects of mastery learning on practical skills, such as insertion of central venous catheters (CVC), thoracentesis, paracentesis, cardiopulmonary resuscitation (CPR), and lumbar puncture (8-14). These studies mostly searched medical resources and databases, and the researchers were all from the Northwestern University of Chicago. However, a limited number of articles have been published in other medical disciplines, such as nursing and occupational therapy. Research suggests that this model can be applied for Iranian students or students from other medical disciplines and professions with different levels of competence.

As most clinical practitioners are looking for ways to improve practical knowledge and skill training for students (15) with respect to their individual characteristics, it seems that mastery learning is one of the models, which can take the students' characteristics into consideration (16). This model is in fact performance-oriented (17), increasing the students' level of knowledge and self-efficacy (18).

2. Objectives

According to our literature review on the efficacy of mastery learning, we aimed to determine whether mastery learning can be applied as a useful and effective method in the clinical education of medical students, who shape the future of the healthcare system of our country.

3. Data Sources

In this systematic review, relevant articles were retrieved from reliable databases. For this purpose, Google Scholar, PubMed, Scopus, Ovid, and ScienceDirect were reviewed for English articles, while Magiran, SID, ISC, Medlib, and IranMedex were searched for Persian articles. The search strategy and article selection were agreed upon by researchers and two faculty members of Iran University of Medical Sciences, based on a predesigned form for data extraction (e.g., author's name, year of publication, type of study, target clinical skills, study population, and findings).

To retrieve English articles, MeSH keywords, including "clinical education", "medical student", "mastery learning", "health professionals", "medical education", and "practical learning", were searched independently or in combination. In addition, the Persian equivalents of these keywords were searched independently or in combination to retrieve Persian articles.

The keywords were searched in the titles of articles published from 1990 to 2016. According to our search, the primary application of mastery learning and its integration in different medical disciplines, especially clinical education, are unknown, and no specific time has been pinpointed so far. Nevertheless, its emergence in medical articles and clinical fields has been documented in the 2000's. Therefore, for comprehensiveness, all papers published between 1990 and 2016 were reviewed in this study. To prevent bias, the search was conducted by two researchers independently using the data collection form. Agreement on controversial and disputed issues was established based on scientific discussion and consensus.

The inclusion criteria in this review were as follows: (1) Compliance with the research standards based on the critical appraisal skills program (CASP); (2) relevance and structuredness of the paper; and (3) clinical, semi-experimental, case-control, or cohort design. On the other hand, lack of access to the full-text of the article and unavailability of data in the data collection form were considered as the exclusion criteria.

The articles were studied and selected in three stages. First, the title was reviewed, and then, irrelevant papers were removed from the list of findings. In the second stage, by reading the abstracts, relevant articles with clinical, Quasi -experimental, case-control, or cohort design were retrieved. Finally, in the third stage, the entire article was reviewed, and duplicate studies were removed (22 articles). In case the full-text of the manuscript was inaccessible, we sent an email to the corresponding author and asked for a copy of the manuscript. Studies with inadequate or inaccessible data (one article) were excluded from the search.

The manuscripts retrieved by each researcher were thoroughly examined via discussion, and the search results were analyzed in one session; controversial topics were resolved through scientific debate. In the final stage, after confirmation by two faculty members of the Faculty of Nursing of Iran University of Medical Sciences, a total of

Table 1. The Retrieved Articles After Abstract Review

Type of Study	Number of Studies
Clinical trials	5
Quasi-experimental studies	22
Prospective cohort and case-control studies	16
Review articles	3
Case reports	1
Qualitative studies	3

26 articles were included in the study. The search stages are presented in Figure 1. The articles were searched from March 2016 to June 2016, and data were extracted and analyzed until October 2016.

4. Results

According to our search in different databases, a total of 503 articles were retrieved, 50 of which were selected after reviewing the abstracts. By examining these articles, clinical, Quasi -experimental, case-control, and cohort trials were selected and reviewed (Table 1). Among the evaluated articles, we focused on the ones which had examined mastery learning in clinical education for medical students. The number of articles retrieved at this stage was 26 (24 articles in English and two articles in Persian language) (Table 2).

5. Discussion

The most important finding of this study is that we can use the mastery learning model in other medical disciplines. This finding is compatible with the nature of mastery learning, which is rooted in behavioral learning theories, and it seems that this instructional method can be used for training psychomotor skills (6). However, it should be noted that mastery learning influences other areas of learning, as well and can be used to increase knowledge, self-confidence, self-efficacy, and communication skills of individuals (5, 8, 14, 18, 19, 26, 27).

Based on the present findings, the most important outcome of mastery learning is improvement of the learner's competence. Besides improving clinical skills, this method is also applicable in other fields, such as nursing (5, 12, 18, 21, 22, 24, 26, 27, 30) and occupational therapy (36). Nevertheless, in a study by Kessler et al., the pretest and posttest scores of medical students were not significantly different. They stated that an independent course based on mastery learning cannot increase the skills significantly (25), thereby highlighting the importance of time in mastery learning.

One of the disadvantages of mastery learning is being time-consuming (5). In the model proposed by Carrol, longer learning time was associated with a higher level of learning (37). On the other hand, Rahmani et al. found that mastery learning for clinical training is not more time-consuming than the conventional method. In fact, this method has been proposed for classrooms with a high number of students, where a great amount of time is devoted to students. Overall, in mastery learning, students who have achieved the level of mastery can spend more time on re-training until students with weak performance can reach their level (5); they can also help less motivated students to achieve the desired mastery level.

Based on the results of a study by Anbari and Ramezani, the goal of medical education at universities is to develop self-centered learning, improve psychomotor skills, time management skills, self-confidence, and communication skills, and discourage passivity among students (38); most of these goals were highlighted in our review of the literature. One of the most important findings of the present study was the improved performance and skill mastery of students, while one of the main goals of medical education is to improve psychomotor skills. In the study by Barsuk et al., IM residents who had participated in the mastery learning course were more confident in bedside thoracentesis and did not refer their patients to other physicians (19). Similarly, in two other studies, the participants' confidence increased after training (8, 26).

Moreover, in the study by Cohen et al., one of the positive outcomes of participation in the mastery learning course was improvement of communication skills with patients (24). Zendejas et al. also showed that time management skills of the participants improved after the mastery learning course (29, 31). Two other objectives of medical education, i.e., self-centered learning and prevention of student passivity, are also the main features of mastery learning method, which allow students to progress at their own pace according to their competencies (16).

Another important finding of this systematic review is related to the effect of mastery learning in the clinical setting on reducing post-treatment complications, especially after invasive procedures, such as CVC insertion, arterial blood sampling, and paracentesis. In a previous study, which aimed to determine the complications of CVC insertion, it was found that 54 out of 155 patients had developed complications (39). According to our review, several studies have focused on the important role of mastery learning in reducing the complications of invasive procedures (23, 26, 29, 31, 33).

In summary, the mastery learning method can be ap-

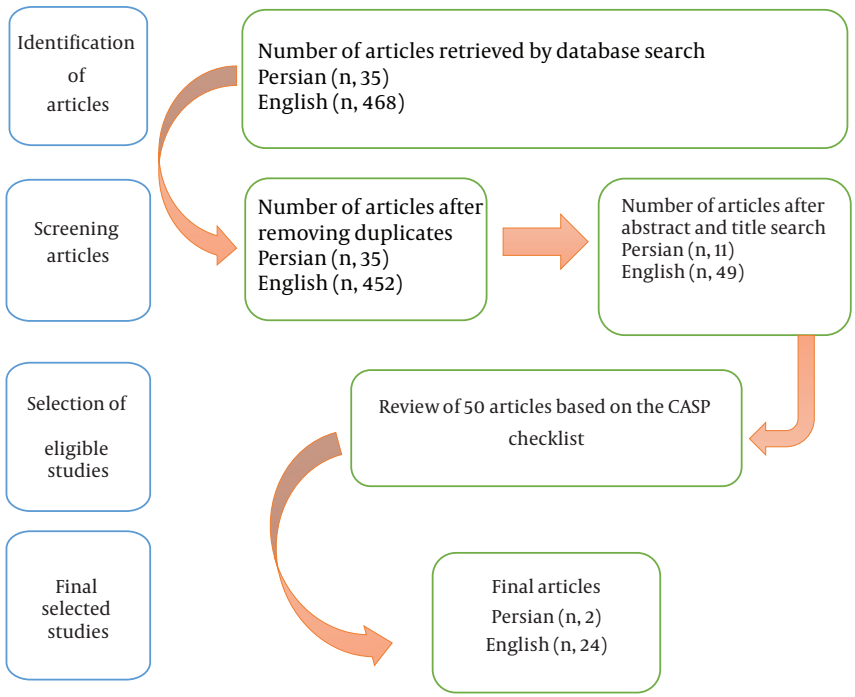

Figure 1. The process of systematic review (PRISMA, preferred reporting items for systematic reviews and meta-analyses)

plied in different branches of health sciences. Previous studies have evaluated this method in medical practice, nursing, and occupational therapy, confirming its significant role in the skill improvement of students. According to the literature, this method can be used as both an instructional approach for students and in-service training for hospital staff. Therefore, considering the community's need for professional health experts who have reached a high level of clinical competence during training, mastery learning can be applied to prevent the needless encouragement of highly motivated students and inattention to weak students, as reported in educational systems. It can be concluded that postgraduate students with mastery learning have acquired the basic clinical skills (5).

6. Conclusions

This review study supports the use of mastery learning method in the clinical education of students. Considering the great impact of this method on performance, it is recommended for practical training to ensure that most students achieve the target educational goals after the course. Also, extensive studies are suggested before the application of this model regarding its disadvantages, costs, and prerequisites.

6.1. Limitations

The main limitation of the present study is that we only searched electronic databases, whereas books, research projects, and unpublished studies could have been also taken into consideration. Also, the search only included English and Persian articles.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: None declared.
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Table 2. The Retrieved Articles About Clinical Education Among Medical Students

References	Type of Study	Country	Target Clinical Skills	Study Population	Results and Conclusions
Barsuk et al. (19)	Prospective cohort	USA	Thoracentesis	Three groups including 112 IM residents completing simulation-based mastery learning during 2012-2015; 122 IM residents with traditional training; and 51 physicians working at hospital	Traditionally trained residents were more likely to refer patients to other doctors and cited lower confidence as the main reason. However, residents with mastery learning had greater confidence and were more likely to perform bedside thoracenteses than refer the patient. The difference in the pretest and posttest scores was also significant in the intervention group.
Reed et al. (20)	One-group pretest-posttest design	USA	Ultrasound-guided peripheral intravenous line placement; basic skin laceration repair; chest compression; bag-valve mask ventilation; defibrillator management during ventricular tachycardia and ventricular fibrillation; and defibrillator management during pulseless electrical activity and cardiac arrest	A total of 135 students on an EM clerkship	All students passed the tests after the course, and the percentage of students who reached the MPS was significant. Ninety-eight percent of the students scored at or above MPS for all skills after one year.
Barsuk et al. (21)	One-group pretest-posttest design	USA	Central line maintenance (medication administration; injection cap changes; tubing changes; blood drawing; and dressing changes)	A total of 49 ICU nurses	The posttest scores of nurses increased by 100% for central line maintenance, compared to the pretest.
Cason et al. (22)	Cohort study	USA	Nasogastric tube insertion	A total of 134 second-year nursing students and 52 first-year bachelor students of nursing (student pairs)	All students obtained a checklist score of 100% after the program.
Barsuk et al. (23)	Cohort study	USA	CVC insertion	EM and IM residents before mastery learning (control group; 2008 - 2010) and after participation in the mastery learning program (test group; 2010 - 2012)	The difference in the pretest and posttest scores of residents was significant regarding CVC insertion. There was a 74% reduction in the incidence of central line-associated bloodstream infections during 2010 - 2012, when the residents participated in the mastery learning program.
Roha et al. (18)	Three-group pretest-posttest design	South Korea	CPR skills	A total of 255 second-year nursing students participating in an emergency nursing course in three groups	The level of knowledge and self-efficacy significantly improved after the clinical course, compared to the baseline. However, the scores of knowledge, self-efficacy, and psychomotor skill error were not significantly different between the groups.
Cohen et al. (24)	Cohort study	USA	Cardiac auscultation, paracentesis, lumbar puncture, management of critically ill patients, and communication with patients	A total of 47 interns participating in a mastery learning course in 2011 versus 109 second-year historical controls (without participation in the course)	All trained interns met or exceeded the MPS and performed significantly better than historical control interns on all skills.
Colquitt et al. (14)	Pretest-posttest design without a control group	USA	Advanced CPR skills	A total of 16 residents	The level of knowledge and skills of students in the posttest was significantly higher than the pretest. The level of knowledge was also high after one year, and skills had significantly improved, compared to the posttest.

Kessler et al. (25)	Randomized trial	USA	Infant lumbar puncture and child intravenous line placement	A total of 200 medical interns (104 cases of lumbar puncture and 96 cases of intravenous line placement)	The difference in the pretest and posttest scores for the evaluated skills was not significant. Participation in a single mastery learning session was insufficient for these skills.
Scholtz et al. (26)	Prospective study	USA	CVC dressing change	A total of 525 inpatient nurses	Knowledge and self-confidence improved significantly in the posttest, compared to the pretest. On the other hand, the number of dressings requiring corrective prompts and central line-associated blood stream infections significantly decreased.
Tang and Dong (27)	Cohort study	Singapore	Assessment of patients with exacerbation of asthma or chronic obstructive pulmonary disease and administration of bronchodilator therapy	Eight primary care nurses	The knowledge of nurses increased successfully in the posttest, compared to the pretest. In the pretest, 67% of nurses reported moderate knowledge of target skills, while in the posttest, 90% reported good or excellent knowledge.
Ahya et al. (28)	Prospective cohort	USA	Hemodialysis catheter insertion	Eighteen nephrology fellows	The nephrology fellows who completed the training course displayed high levels of performance during insertions after six months. The results indicated a significant reduction in the posttest catheter insertion scores, compared to the immediate posttest (posttest after training based on the mastery model).
Barsuk et al. (12)	Two-group pretest-posttest design	USA	Lumbar puncture	A total of 58 first-year IM residents participating in a mastery learning intervention versus 36 nephrology residents in the second, third, and fourth years with traditional training	Comparison of the pretest and posttest scores of the test group showed significant improvements in the spinal sampling performance, and all these residents met the MPS. The performance of traditionally trained neurology residents was significantly lower than the test group, and only 6% met the MPS.
Barsuk et al. (13)	Pretest-posttest design without a control group	USA	Paracentesis	A total of 58 first-year IM residents	The residents' paracentesis skills improved significantly from pretest to posttest, and all residents met or exceeded the MPS.
Zendejas et al. (29)	One-group two-stage design	UK	Laparoscopy	Nine medical students, 36 general surgery residents, and three surgery fellows (n, 48)	All learners achieved the mastery endpoints in an acceptable amount of time. The surgery duration and complications during and after surgery decreased, while the performance and participation increased.
Baghaei et al. (30)	Semi-experimental, two-stage, pretest-posttest design	Iran	Cognitive and behavioral skills of students in ICUs	A total of 28 nursing students in the eighth postgraduate year	The pretest-posttest comparison of the mean performance scores indicated a significant difference among students. Also, comparison of clinical competence of students before and after traditional and competence-based methods showed significant differences.

Zendejas et al. (31)	Single-blind randomized clinical trial	USA	Laparoscopy	A total of 50 residents (26 residents in the intervention group and 24 residents in the control group)	The mastery learning curriculum decreased operative time, improved trainee performance, and decreased intra- and postoperative complications.
Butter et al. (32)	Two-group pretest-posttest design	USA	Cardiac auscultation	A total of 108 medical students (77 third-year students with a mastery learning-based curriculum and 31 fourth-year students with traditional training)	The trained third-year students demonstrated significantly higher cardiac auscultation performance, compared to the fourth-year students.
Cohen et al. (33)	Experimental design	USA	CVC insertion	A total of 69 IM and EM residents	The catheter-related complications decreased, and the costs decreased by 7000 dollars per year.
Barsuk et al. (34)	Observational cohort	USA	CVC insertion	A total of 103 IM and EM residents (27 traditionally trained residents and 76 simulator-trained residents)	The simulator-trained residents reported fewer needle passes, arterial punctures, catheter adjustments, and higher success rates, compared to traditionally trained residents.
Barsuk et al. (35)	Prospective observational cohort	USA	Hemodialysis catheter insertion	A total of 18 nephrology fellows (six fellows with traditional education and 12 fellows with a mastery learning-based curriculum)	Performance of traditionally trained fellows was poor, and only 17% met the MPS, while performance of simulator-trained fellows was significantly improved.
Barsuk et al. (8)	Cohort	USA	CVC insertion	A total of 41 IM residents in ICU (13 traditionally trained and 28 simulation-trained residents)	The simulation-trained group required fewer needle passes to insert a catheter. In addition, they displayed more self-confidence and accuracy in the procedural skills, compared to traditionally trained residents.
Rahmani et al. (5)	Semi-experimental, two-group, pretest-posttest design	Iran	Cognitive and functional skills in airway management, nasogastric tube insertion, rapid neurological examination, and arterial blood sampling	A total of 52 fourth-year nursing students	In all cognitive and practical skills, the difference in the pretest and posttest scores of students with mastery learning was greater than that of the traditionally trained group.
Wayne et al. (9)	Pretest-posttest design without a control group	USA	Thoracentesis	A total of 40 third-year IM residents	Performance improved by 71% from pretest to posttest in the mastery learning group, and all residents met the mastery standard.
Wayne et al. (10)	Pretest-posttest design without a control group	USA	Advanced CPR skills	A total of 41 second-year IM residents	Performance improved significantly after simulator training, and all residents met or exceeded the MPS.
Wise and Iris (36)	One-group pretest-posttest design	Australia	Patient handling skills	A total of 88 second-year occupational therapy students	Difference in the pretest and posttest scores was significant, and all students could master 100% of patient handling skills in the posttest.

Abbreviations: EM, emergency medicine; IM, internal medicine; MPS, minimum passing standard.

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Clinical Teaching of Residents in Operating Room: A Review of Methods and Strategies for Strengthening Teaching and Learning

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Abstract

Background: The operating room is considered a learning platform for technical and non-technical skill training. Training in operating rooms helps learners from different groups, especially surgery residents, acquire the necessary clinical competence. Nevertheless, operating room training is only effective if it is accompanied by efficient and applicable teaching methods.
Objectives: The current study aimed at reviewing the strategies and methods to enhance teaching and learning of residents in operating room settings.
Methods: The current review study was conducted based on library studies and review of the literature. PubMed, SID, and MagIran databases, as well as Google Scholar search engine, were searched using relevant phrases and keywords. A total of 60 articles were retrieved, out of which 22 articles were identified as consistent with the study objectives.
Results: The data obtained from the literature review were categorized into three sections: "General structure of training in the operating room", "strategies and methods to strengthen teaching and learning in the operating room", and "structured training models in the operating room". Finally, application of these strategies in clinical teaching was summarized in three stages: Before operation, during operation, and after operation.
Conclusions: The operating room is a clinical facility with specific characteristics, which can challenge teaching in this setting. However, application of effective strategies and methods, as well as efficiently structured training based on the proposed models can facilitate teaching and learning enhancement in operating rooms.

Keywords: Medical, Education, Learning, Teaching Methods, Operating Room, Residency

1. Context

The operating room is a learning platform for training technical and non-technical surgical skills. Training in operating rooms helps learners from different groups, especially surgery residents, acquire the necessary clinical competencies (1, 2). The operating room is a specific environment (3), where learning is based on interactions between individuals, surgical scenarios, and educational communication between the instructor and learner (4).

In the operation room, educational communication between the clinical instructor and learner is often short, spontaneous, unplanned, and opportunistic. Although most instructors of the operation room have extensive experience in teaching in such settings, only few have the ability to enrich and optimize the opportunities and educational challenges (5). Therefore, it is necessary for clinical instructors to become acquainted with the strategies and methods of teaching and learning enhancement in the operating room. The familiarity of surgical teachers with strategies and principles of learning increases their ability to provide effective education and creates a rewarding environment for teachers and learners to interact (1, 6).

In addition to the competencies and characteristics of clinical instructors, learning environments are among the influential factors in learning (7). In the operating room, as in other clinical settings, the learning environment plays an important role in creating learning opportunities (8). Some studies consider the clinical learning environment as a set of learning opportunities offered to learners during a teaching period (9). Undesirable learning environments prevent surgery residents from performing surgical procedures and reduce the motivation to learn surgical skills (7).

The operating room environment is highly threatening, and surgeries are quite risky in nature. In such clinical settings, human factors affect the patients safety, and surgeon's performance is a critical element in operation

success (3, 4). The limitation of training hours and potential time constraints in the operating room also affect education in this setting (2, 3). In order to remove these limitations and promote the teaching-learning process in the operating room, application of modern educational approaches and effective teaching methods are necessary (4, 6, 7).

Targeted and planned teaching can help learners become qualified surgeons (4). Experienced surgical trainers and use of effective teaching methods can provide unique opportunities in operating room training (4, 6, 7, 10). The results of numerous studies show that application of simple educational strategies or employment of teaching methods and models with a correct and multi-stage structure can help to create such educational opportunities. For instance, in a study by Kieu et al., providing feedback to learners was described as a simple learning strategy, which can be effective to enhance learning and acquiring clinical decision-making abilities in the operating room (3).

In another study by van der Houwen et al., teaching-learning processes were described as interactions between learners and clinical instructors as a model including input, process, and output. Moreover, educational strategies required for such learning processes were presented in a framework including educational strategies before, during, and after operation (11). A study by Lyon also emphasized on the dynamics of teaching-learning processes and the need to structure the training process in the operating room by presenting a model to structure teaching-learning processes in this clinical setting (12).

In general, learning in clinical situations follows clinical teaching and arises from the learners' engagement with the clinical learning environment and their participation in clinical learning activities predicted by clinical teachers (13). Therefore, the application of appropriate educational strategies and teaching methods can help to strengthen teaching and learning processes and facilitate learner empowerment. According to the necessity to improve teaching and learning processes in the operating room and the importance of applying proper teaching strategies and methods by clinical instructors, the current study aimed at reviewing several articles and introducing different strategies and methods to enhance teaching and learning in the operating room and improving the teaching-learning process in this clinical setting.

2. Methods

The current review study based on library studies and literature review aimed at investigating and introducing various strategies and methods to improve teaching and learning in the operating room and promoting the teaching-learning process in this clinical setting. In the current study, SID and MagIran databases were searched for Farsi articles, and PubMed database was searched for English articles. The Google Scholar search engine was also used to complete the search for articles. English articles, published from 2000 to 2016, were searched with the following keywords in the title: "education and operating room", "learning and operating room", and "teaching and operating room. On the other hand, Farsi articles, published from 2006 to 2016, were retrieved using the Farsi equivalents of the English keywords.

In the first stage, a total of 60 articles including 56 English and 4 Farsi articles were found. These articles were first reviewed for repetition, and accordingly, 14 articles were excluded. In the second stage, the articles were studied in terms of title relevance, and 10 other articles were excluded. In the third stage, the articles were examined for the availability of full-text, and seven articles were excluded. In the fourth stage, the articles were re-examined in order to ensure their relevance to the purpose of the study. Finally, 22 articles were found consistent with the purpose of the study, and articles precisely providing educational strategies, models, and methods to enhance teaching and learning were included. The process of reviewing the articles is presented in Figure 1, and characteristics of articles included in the study are presented in Table 1.

3. Results

The results of reviewed articles were categorized into three general categories, including "general structure of training in the operating room", "strategies and methods to strengthen teaching and learning in the operating room", and "accurately structured training models in the operating room" (Table 2). Application of these strategies is summarized and presented as the framework of clinical education process in three stages: before operation, during operation, and after operation.

Table 2. The Main Contents of the Reviewed Articles

Column	Main Contents
1	General structure of training in the operating room
2	Strategies to strengthen teaching and learning in the operating room
3	Structured training models in the operating room

3.1. General Structure of Training in the Operating Room

Education is an interactive process, which occurs in a supporting learning environment (9). The teaching-learning process in clinical education consists of three main elements: Learner, clinical teacher or educational

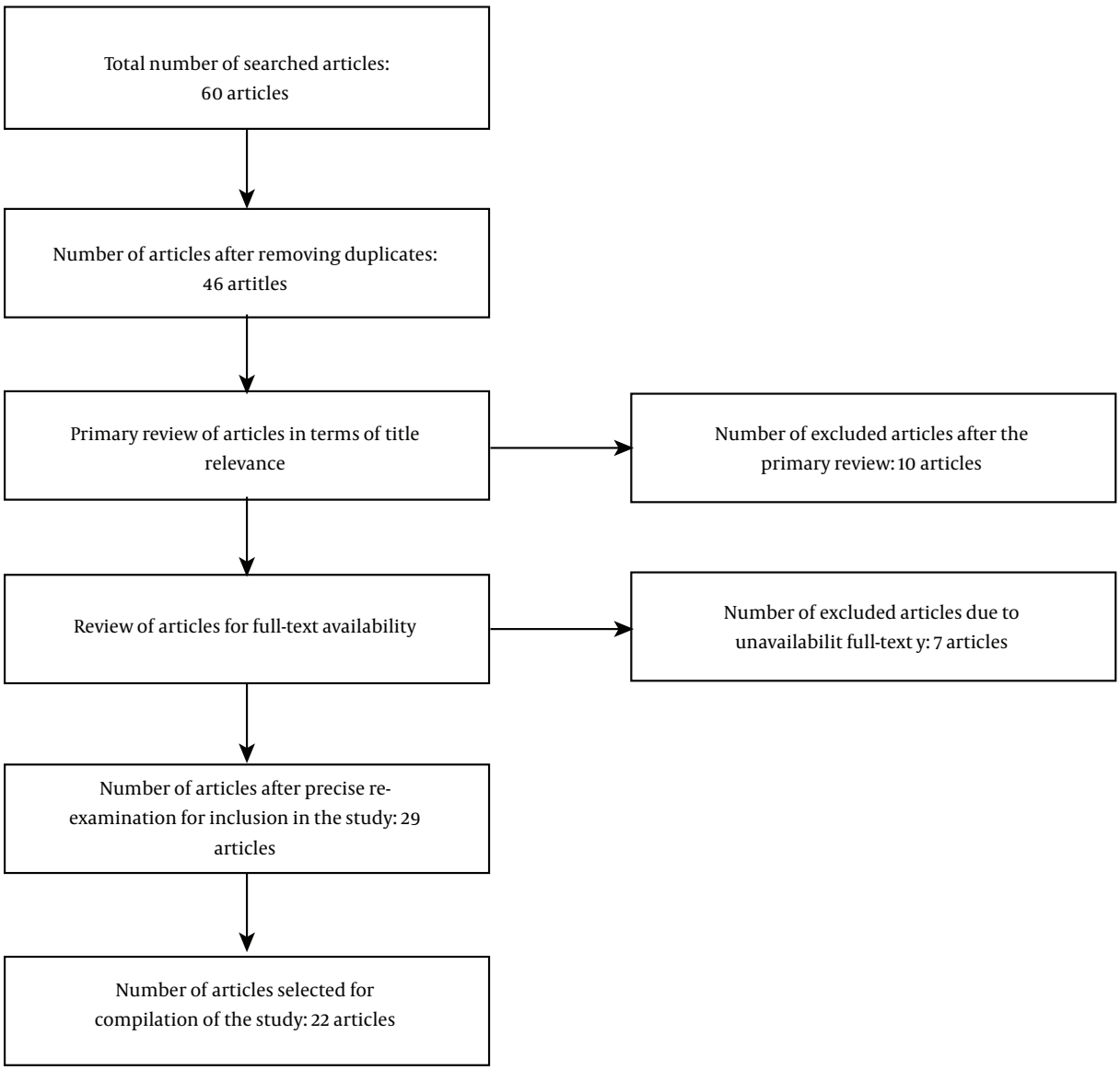

Figure 1. The articles search and selection process

observer, and learning context (8). All three elements should have the necessary features and functions to provide effective clinical teaching, which more specifically encompasses scheduled interactions and communication between the clinical instructor and learner. Similarly, training in the operating room requires effective interaction of these three elements and their practical implementation. A study by Vikis et al., described the educational measures and practices for each teaching-learning element, as shown in Figure 2 (4):

The process of clinical education in the operating room can be divided into three stages: before operation, during operation, and after operation. At each stage, the clinical instructor and learner have responsibilities and characteristics, which can create effective teaching-learning processes. The learning context and environment should also have the proper characteristics to provide effective clinical education.

3.2. Strengthening Strategies for Teaching and Learning in the Operating Room

As mentioned in the literature, there are numerous strategies and teaching methods, which can be used to create unique opportunities to educate learners in the oper-

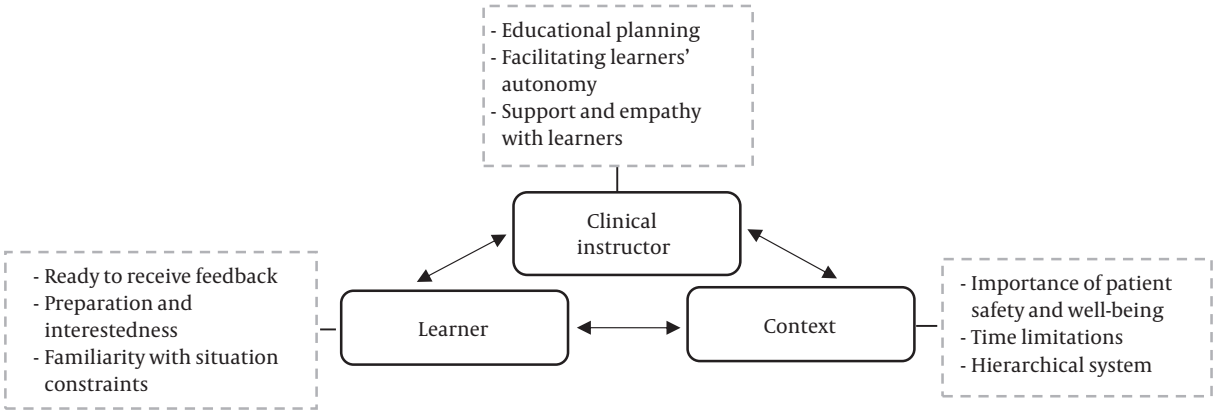

Figure 2. Interactions between the clinical instructor and learner to create educational situations

ating room. In this section, these strategies and teaching methods are introduced and presented separately.

3.2.1. Learner Preparation

One of the essential elements of teaching technical and surgical skills is the preparation of the learner for education, which is one of the important tasks of an instructor. At this stage, what the learner intends to learn is determined (6). Learner preparation before operation creates a more productive learning environment. In order to prepare the learner, there should be a mutual and targeted interaction between the instructor and learner before operation (7). The goal of this interaction is to assess the learner's needs and determine the educational purposes both for the learner and teacher (7, 27). Determination of the learning goals helps to guide learners and increases their concentration. In the communication between the instructor and learners at this stage, the learners weaknesses and needs are identified. The learners unconsciously start integrating their experiences and regularly review and reflect on them during communication (reflection before operation) (7). Moreover, at this stage, it is necessary to provide precise information about the procedure; providing this information reduces concerns and increases readiness (27).

3.2.2. Identification of Learners Level

Similar to other clinical settings, learners from different levels are present in the operating room. Along with teachers, different learners are constantly observing educational situations. In other words, medical learners, surgery residents at different levels, and surgical instructors are constantly observing each other's behaviors (11), and in many cases, the educational situation is familiar to them. It is necessary for a surgical trainer to identify the learners' level, interpret their behaviors in order to determine their motivation and commitment (4, 12), and accordingly prepare the educational situation and adjust the training time in the operating room. In general, the instructor should involve the learners in educational situations and experiences, based on the learners' objectives and needs (12, 27).

3.2.3. Creating Learning Motivation and Interest

Motivation of learners is one of the factors that enhances learning. Enthusiasm of the instructor, which reflects his/her interest in the subject and teaching, is one of the most influential factors to encourage the learners (5). In clinical teaching in operating room, both learners and instructors should be mutually motivated. The learners should be keen on learning since the clinical instructor tends to see the interested learners (4). The learners high motivation in learning and participation in educational situations and activities, arranged by the teacher, improves their learning and practice, increases the instructor's motivation in teaching, and improves the teaching process (4, 5, 9).

3.2.4. Thorough Monitoring of Learners Performance and Patient Safety

Meeting the patients needs is the first concern of a surgical trainer (23), and patient safety in surgical training and operating room is one of the most important issues to be considered (28). Surgical training may intrinsically pose risks to the patients safety (29), and the instructor should create a balance between his/her therapeutic and educational roles. The instructor should be aware of the learners abilities and autonomy during surgical procedures, provide an appropriate learning environment, and ensure the patients safety at the same time (23). Sometimes, it is necessary for instructors to empathize with learners, support

them both psychologically and emotionally, and motivate them (4).

3.2.5. Assessment of Learners Performance and Giving Feedback

The clinical teacher should observe and evaluate the learners performance during operation, point out their weaknesses and strengths, and give them feedback; therefore, the learners can correct the shortcomings and reinforce the strengths, as it is very difficult for learners to evaluate their own performance (5). Meaningful and constructive feedback is an essential aspect of teaching and learning, which can provide learners with constructive information (30). Without giving feedback, mistakes are not corrected, clinical performance is not reinforced, and clinical competencies are either experimentally acquired or never learned (31). Feedback strengthens the reflection process and helps the learner predict future learning experiences and plans. Feedback should be purposeful and appropriate to the learners needs (32).

Feedback is provided by clinical teachers and provides reflection opportunities for learners (33). Both giving feedbacks and guiding reflection can lead to progression and improvement of professional performance (34, 35). Feedback can be provided instantaneously (immediately after the mistake) or be postponed (32). In operating room training, the clinical instructor can provide the learners with the necessary feedback immediately after observing the mistake in order to maintain patient safety during operation, or if possible, wait for the operation to end and then have a conversation with the learners to give feedback. In both cases, feedback should be provided in accordance with the principles of learners feedback. In order to teach non-technical skills in the operating room, two post-operative strategies of feedback and briefing are identified effective (16, 22). Surgery residents believe that formal and planned feedback, briefing, discussing, and interpreting after operation, are very effective in teaching non-technical skills in the operating room (16).

3.2.6. Creating and Strengthening Reflection

Reflection is a set of mental activities that learners use to explore their experiences in order to gain new insights (36). Reflection is one of the essential processes to obtain professional qualification (37). The goal of reflection in the learning process is to create meaningful and profound learning and improve performance (35). Reflection of practical and professional performance is referred to as functional reflection, which is the result of re-evaluation of practical situations to continue professional learning and progress (37). In operating room teaching, the purpose of reflection is to reflect on performance.

Medical and educational experiences and challenges in the field of medical education trigger the reflection process. There is also a direct connection between experience and professional expertise. However, mere experience is not enough to acquire professional expertise. Experiences turn into educational opportunities and eventually facilitate learning of clinical competencies and professional expertise if there is critical reflection on performance, with a focus on performance weaknesses and performance improvement (38). In terms of time, reflection can be categorized into three classes: before, during, and after operation (39).

Since reflection enhances the learners performance and expertise acquisition, each stage of clinical teaching in the operating room can be used to create and enhance learners reflection. The learners have reflection before the operation if they unconsciously or consciously (encouraged by the clinical instructor) begin reflecting and assessing their experiences and use previous experiences to improve their performance. The learners may also have reflection during or after operation. In operating room teaching, all three reflections are valuable; however, most reflections happen after surgery, which helps both the learners and teachers determine future learning objectives and plan for clinical experiences. Therefore, reflection after surgery has several practical implications for the teachers and learners:

Programming and thinking about the ways to improve performance and correct weaknesses.

Guiding the learners in order to determine their needs and objectives for future learning.

Helping the teachers determine the learning experiences and future educational challenges.

3.2.7. Using a Structured Teaching Framework

Using a structured teaching framework facilitates the application of educational principles in the process of surgical education and increases the educational opportunities (15).

3.2.8. Positive Role Modeling

The importance of teaching and learning through role modeling in operating room teaching is described in numerous studies (17, 40, 41). Learners mainly learn behaviors and skills through observing roles in the operating room. Behaviors such as teamwork, interactions with the patients and colleagues, respect, and composure are among skills acquired by role modeling in the operating room (17).

3.2.9. Improvement of Learning Context

3.2.9.1. Creating a Constructive Learning Environment

The environment in which learning takes place can be either a stimulating environment, which improves learning, or an inhibiting environment, which obstructs learning. Features of a supporting learning environment are

similar to those of a satisfactory work environment. These features include mutual respect and interaction, shared vision, group reflection, and support preference over blame. In teaching hospitals and departments, "learning" is a very important issue. In these hospitals, learners are legal participants in learning activities, and their learning needs should be addressed. It means that learners should engage in constructive and meaningful clinical activities to be able to act independently (5).

The quality of clinical experience represents and guarantees the quality of medical education (9). In order to determine the quality of learning experiences, there is a need to examine evidence, which improves learning (9). Active engagement and participation of learners are keys to effective learning in the operating room (12). In operating room teaching, a constructive learning environment includes programming learning activities, meaningful clinical experiences, and active participation of learners (25) with the help of surgeons that can be effective and positive role models for learners (5, 9).

3.2.9.2. Group Communication and Positive Interactions

The process of training an apprentice into a competent surgeon is heavily influenced by communications in the operating room (22). Positive interactions in the operating room reinforce learning, and open communication is essential to learning improvement. On the other hand, poor and inappropriate group interactions and communication negatively affect both patient safety and learning process (4).

In a study by Roberts et al., which examined the analysis of oral and verbal interactions between the instructor and learner, four categories of interactions were identified including instrumental communications, pure teaching communications, instrumental and teaching communications, and interactions regardless of surgery (Burnet). The purpose of instrumental communications is interaction between the learner and teacher in relation to the way the operation is performed. These interactions are mostly aimed at promoting operations and have few educational purposes. On the contrary, pure teaching communications are purpose-oriented and only related to learner education (10).

3.2.10. Video-Based Training

Application of video recording during surgery is a new and applicable method, which can complement training in the operating room (14). The findings show that application of this method is very suitable for teaching high levels of cognition such as clinical decision-making, individual training, and feedback. Both residents and teachers claim that this training method is useful for training in the operating room; in addition to increasing educational opportunities, it reduces the pressure of teaching in the operating room (14). Video-based learning has many advantages including increased concentration on learning, creating valuable learning opportunities, providing feedback, and facilitating cognitive thinking (14).

3.3. Models with a Proper Structure for Teaching in the Operating Room

Sometimes, structured models are used to facilitate teaching in the operating room. Two of the most important training models in the operating room include the Zwisch and briefing, intraoperative teaching, debriefing (BID) models.

3.3.1. The Zwisch Model

This model was presented by DaRosa et al., for teaching and evaluating the operating room. This model provides four levels of supervision and teaching by instructors, including "show and tell", "smart help", "dumb help", and "no help". In this model, at each level, the teacher's intervention is reduced and the learners autonomy in operation is increased. At each level, specific types of behavior and performance are determined for the learners and surgical instructors. Zwisch model is designed for the learners step-by-step progress towards autonomy in surgery (19).

3.3.2. BID Model

This model is one of the most suitable models for purposeful teaching in the operating room. BID is an acronym for:

3.3.2.1. Briefing

It is conducted two to three minutes before surgery. The clinical teacher examines the learners needs through conversation and questions.

3.3.2.2. Intraoperative Teaching

It is performed during surgery. The teacher instructs and guides the learners in accordance with their needs.

3.3.2.3. Debriefing

The teacher asks questions to encourage the learners to evaluate and reflect on their own performance. The learners begin investigation and reflection on their own performance and determine their future learning objectives. Generally, this stage has four learning outcomes, including "reflecting", "improving performance", "correcting performance", and "planning for future objectives".

3.4. The Proposed General Format for Clinical Teaching in the Operating Room

A set of teaching and learning reinforcement strategies in the operating room can be summarized, categorized, and presented in three stages; i e, before, during, and after operation Figure 3.

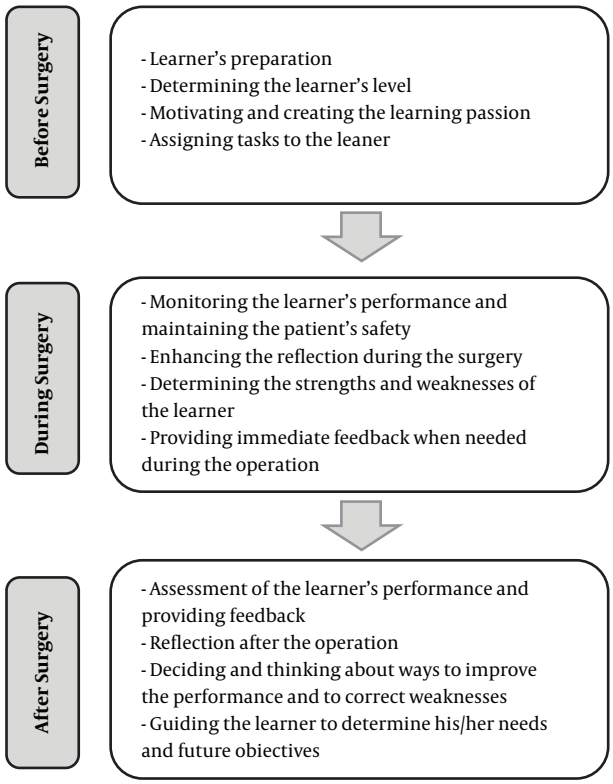

Figure 3. The overall format proposed for clinical teaching in the operating room

4. Discussion

The current study aimed at reviewing a number of studies in order to introduce effective teaching strategies and methods to strengthen teaching and learning in the operating room. The results were divided into three categories: "General structure of training in the operating room", "strategies for strengthening teaching and learning in the operating room" (i.e. learner preparation, identification of learners level, motivating and creating learning interest, careful monitoring of learners and maintaining patients safety, assessment of learners performance, providing feedback, creation and enhancement of reflection, application of a structured training framework, positive role modeling, improving the learning situation, and video-based education), and "structured training models in the operating room" (i.e. the Zwisch and BID models). Subsequently, these strategies were expressed in form of a complete training process in the operating room. Generally, the goal of training in the operating room should be turning pure discovery learning into guided discovery learning (20); in fact, the application of teaching strategies can make such conversion possible.

The presented strategies, including feedback strategy, were noted in most studies. Feedback is an important teaching-learning principle, which has a significant impact on the improvement of learning, especially in clinical and practical skill training in operating rooms (16-20, 26). Learning in the operating room is "learning by doing", which is not effective without providing constructive feedback to learners (20). In order to have effective feedback, it should be presented in accordance with feedback principles. In a study by Snyder et al., residents claimed that they received less feedback than what clinical teachers believed; this could be due to the fact that feedback was not presented constructively (20).

One of the teaching methods, which can improve learning in the operating room, is video-based teaching. One of the influential features of this method is providing feedback to learners (14). Residents believe that surgeons often investigate and evaluate their previous experiences, but rarely help them determine their learning goals or provide feedback after surgery. By using structured teaching techniques in clinical operating room training, one can integrate effective strategies to improve the learners education. For instance, in the BID model, the teacher can investigate the needs and objectives of the learners and set future objectives (20).

In a study by Leung et al., the effect of structuring educational situations in the operating room was studied based on a specific teaching format, focused on setting goals and providing feedback after the operation. Their results showed that application of educational frameworks to structure educational situations in the operating room increased the satisfaction of surgeons and residents, provided an opportunity to give feedback, and improved the concentration on learning objectives (15).

Structuring educational challenges requires an experienced clinical instructor for teaching and mentoring. In a study by Skoczylas et al., seven common features of a clinical instructor were described as follows: emphasis on anatomical symptoms, supportive use of perceptual-motor teaching (learners are trained in a way that they can combine their perceptions and motor senses during surgery and procedures), encouraging practice and repetition, strengthening primary autonomy, exuding confidence, showing composure in the operating room, and accepting the responsibility for mistakes and their consequences (21).

Surgical trainers typically instruct learners by using rapid and effective, but untested methods. Instructors in an environment such as the operating room, should help learners apply their knowledge in the process of clinical reasoning, give them feedback, and develop clinical independence in learners (21); these features of clinical trainers can be integrated into the Zwisch model (19). In fact, the application of structured teaching methods can improve teaching and learning processes in clinical situa-

tions, particularly challenging situations such as the operating room.

The current review study included several articles, as presented in Table 1. Nevertheless, future studies can provide more profound results by searching more databases and using more keywords. It is suggested that a more comprehensive review, as well as empirical analysis, be implemented to examine each of these methods to improve operating room teaching in Iran.

4.1. Conclusions

The operating room is a clinical facility with specific teaching challenges. According to the importance and necessity of learning practical and surgical skills and maintaining patient safety in this clinical setting, it is essential for clinical instructors to become familiar with strategies and methods of teaching and learning and facilitate learners' progress via appropriate application of such methods. With the help of targeted and planned training in the operating room via effective teaching methods and providing structured training, based on the presented models, the educational constraints can be overcome and teaching of competent and skilled surgeons can be facilitated.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Table 1. The Characteristics of the Selected Articles

Source	Journal	Study Design	Study Population	Sample Size	Intervention
Hu et al. (14)	JAMA Surgery	Mixed method	Residents and surgery trainers	10 residents (fourth- and fifth-year medical students)	Video recording of educational surgeries and studying the effects of video-based training
Leung et al. (15)	Australian and New Zealand Journal of Obstetrics and Gynecology	Mixed method	Residents and surgery trainers	64 surgical procedures studied in a structured method	Structuring educational challenges in the operating room and examining educational impacts
Dedy et al. (16)	Annals of Surgery	Non-randomized clinical trial	Surgery residents	Routine surgeries of 11 senior residents (year 3 to 5) and 69 surgeries	Studying the effects of two feedback strategies and examining non-technical skills in the operating room
Hampton et al. (17)	American Journal of Obstetrics and Gynecology	Review	-	-	Review of teaching reinforcement strategies in the operating room
Schenarts and Flowers (18)	JAMA Surgery	Commentary	-	-	Introducing feedback as the best strategy in operating room training
DaRosa et al. (19)	Journal of Surgical Education	-	-	-	Proposing a training model called the Zwisch model for operating room training
Snyder et al. (20)	Journal of Surgical Education	Descriptive	Accreditation Council for Graduate Medical Education (ACGME)	258 surgical programs	Evaluation of operation programs in an online survey
Skoczylas et al. (21)	Academic Medicine	Grand theory	-	5 instructors of gynecology and 16 midwifery interns	Identifying the characteristics and competencies of operation room instructors
Roberts et al. (10)	Surgery	Grand theory	-	1306 interactions	Study of verbal interactions between teachers and learners during operations
van der Houwen et al. (11)	European Journal of Obstetrics and Gynecology and Reproductive Biology	Qualitative	Learners of gynecological surgeries at different levels	-	Presenting a model of skill acquisition in the operating room
Kieu et al. (3)	Education for Health	Qualitative	Surgeons and learners of surgeries at different levels	10 teachers and surgical learners	Analysis of perceptions of surgical teachers and learners about education based on competence in the operating room
Jeffree and Clarke (5)	World Journal of Surgery	Review	-	-	Review of studies in order to provide strategies to strengthen surgical education
Lyon (12)	Medical Education	Multi-method	-	25 teachers and surgery residents	Introducing a teaching-learning model in the operating room
Vikis et al. (4)	The American Journal of Surgery	Qualitative	-	18 surgery residents	Investigating the learners' perceptions about effective educational interactions

Champagne (7)	Clinics in Colon and Rectal Surgery	Review	-	-	Review of studies to provide strategies to strengthen surgical education
Kanashiro et al. (2)	Surgery	Descriptive	General surgery residents	-	Evaluation of operating rooms using a questionnaire (OREEM)
Yule (22)	Surgery	Review	-	-	Study of non-technical skills for surgeons in the operating room
Cox and Swanson (23)	The American Journal of Surgery	Descriptive	Teachers and general surgery residents	20 teachers and 49 general surgery residents at different levels	Study of teaching behaviors in the operating room
Schwind et al. (9)	The American Journal of Surgery	Descriptive	-	114 periods of learning in the operating room	Study of effective factors on learning in the operating room
Roberts et al. (24)	American College of Surgeons	-	-	-	Providing a model of teaching in the operating room: Briefing, intraoperative teaching, debriefing (BID)
Meyer (25)	Nurse Education in Practice	Qualitative	-	65 nursing students	Analysis of operating room learning environments
Mirbagher Ajorpaz (26)	Nursing Education Journal	Review	-	-	Study of the role of mentoring in operating room training

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The Quality of Educational Services for Internship and Apprenticeship Courses at the Community Medicine Department of Kerman University of Medical Sciences, from the Trainees' View Point

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Abstract

Background: Community medicine departments play a major role in the education of medical students in order to provide primary health care services. The appropriate quality of education in such departments plays an important role in providing effective services for health promotion of communities.

Objectives: The current study was aimed to evaluate the quality of educational services at the Community Medicine Department of Kerman University of Medical Sciences from the viewpoint of interns and apprentices.

Methods: The current cross sectional, descriptive-analytical study was conducted on all medical students that completed their internship or apprenticeship course at the Community Medicine Department of Kerman University of Medical Sciences in 2016 as the study population. Data were collected by the service quality measurement questionnaire (SERVQUAL), and analyzed by Independent *t* test, paired *t* test, and one sample *t* test, as well as Pearson correlation coefficient.

Results: Of 244 participants in the study, 58.2% (n = 142) were female and 41.8% (n = 102) male, 57% (n = 139) were in the internship and 43% (105) in the apprenticeship courses. From the students' point of view, the mean score of perception in all five dimensions of educational quality was significantly lower than the expectations score, which indicated a negative gap in the quality of educational services in all dimensions ($P < 0.001$). The greatest quality gap was observed in the responsiveness dimension (- 0.86) and the lowest in the assurance dimension (- 0.59). The utility level of the quality of educational services in the Department of Community Medicine was 84% from the viewpoint of the students. The highest level of utility in the quality of medical services was respectively observed in the dimensions of assurance (86.4%) and empathy (86.1%) and the lowest in responsiveness dimension (79.6%) ($P < 0.001$). The lowest and highest correlations were respectively observed between tangibles and assurance ($r = 0.486$) and between empathy and assurance ($r = 0.708$) dimensions.

Conclusions: In all five dimensions of the quality of educational services, there were negative gap that required planning for quality improvement. Issues such as modifying educational contents and tailoring training to future jobs, modifying educational methods, increasing the contribution of students to educational planning, and updating educational facilities should be considered more urgently in the education quality promotion programs.

Keywords: Quality, Quality of Educational Services, Quality Measurement, Community Medicine, Medical Students

1. Background

The main goals of the healthcare system in all countries are to improve the community health and respond to their changing health care requirements. Human resources of the health system, including physicians, should be trained in such a way to achieve these goals effectively (1). In this regard, as well as traditional training in hospitals, community-based education should be thought to medical students in order to empower them to provide integrated health care services, especially primary health care, health management, planning, implementation, and evaluation of health programs. The best approach to achieve these abilities is community-based education (2, 3).

Community medicine departments, using the community-based education approach, play an important role in the establishment and development of health-oriented knowledge, attitudes, and skills in medical students and prepare them for the provision and management of health services at the first level of the health provider system (4). Since the first level of health services is the most important part of the health system

in the country, it can significantly reduce the health problems of the community if it provides appropriate services. The purpose of the community-based medical education program in community medicine departments is to establish the direct contribution of medical students to the primary health care system of the country in order to teach them various skills such as how to communicate with the community, health needs assessment of individuals and community, health problems management, basic health services provision, and health teams management (3, 5).

Medical students play a main role in heath promotion and heath services management for the community in future. Therefore, the status of providing such services in the health system is directly related to the quality of education (5). On the other hand, the quality of provided services is an important factor in the promotion and success of any organization, i.e., the health system, and should be considered as a strategic and effective issue. Therefore, monitoring the quality of provided services in each sector, including the education sector, is one of the essential components in its effective management (6, 7).

In traditional approaches, quality of services was defined by the characteristics and features of the services or goods; but in modern attitudes toward quality, quality is defined as the customer's satisfaction, and customers or clients of services can assess the quality of services by comparing their expectations and perceptions with the received services (8). Therefore, the quality of service is the gap between customer's perceptions and expectations of the provided service. Evaluation of services by customers is one of the most important steps in improving the quality of services (8, 9). Similar to other organizations, higher education systems must have a realistic understanding of the needs and expectations of their clients, most notably the students, in order to respond effectively to these needs and expectations (10). Based on the approaches that measure the gap between expectations and perceptions of customers about provided services, if the level of expectations of provided services is less than the perception, it indicates the poor quality of the service. In other words, the negative gap shows the level of customer dissatisfaction with the service (11). If the perceptions of customers about the provided services is more than their expectations, customer expectations are well-fulfilled and service quality is appropriate (8).

In Iran, there are various studies on the quality of theoretical and clinical educations. Although most of such studies reported a gap in the quality of educational services, the degree of gap varies in different aspects of the quality of service. On the other hand, there are few studies on the quality of medical education the community medicine departments (3, 5, 7, 12). Due to the importance of community-based education that provides students with the knowledge and skills required to meet the health needs of individuals and communities.

2. Objectives

The current study aimed to evaluate the quality of educational services in the Department of Community Medicine from the viewpoint of students in internship and apprenticeship courses in order to use the results in programs designed to promote the quality of educational services.

3. Methods

The current descriptive-analytical study was conducted on 255 medical students attending internship or apprenticeship courses at the Department of Community Medicine, Kerman University of Medical Sciences from April to March 2016 by the census method. Guest and transition students were excluded from the study according to the exclusion criteria. Data of the quality of educational services were collected using the service quality measurement questionnaire (SERVQUAL). Demographic variables including age, gender, marital status, and type of educational course (internship or apprenticeship) were also recorded. The self-report questionnaire was completed by the subjects every month after the completion of the internship or apprenticeship courses and after explaining the study objectives to them. In terms of ethical considerations, the questionnaires were anonymous with no studentship number; the students were free to withdraw from the study at any stage. The study was approved by the Ethics Committee of Kerman University of Medical Sciences (code No. IR.KMU.AH.REC.1396.1590).

The SERVQUAL questionnaire includes five dimensions: Tangibles (conditions and physical atmosphere of services providing environment such as facilities, equipment, staff, and communication channels), reliability (performing services in a reliable manner to ensure customer's expectations), responsiveness (willingness to collaborate and support customer), assurance (competence and ability of personnel to build trust and confidence toward the organization in customers) and empathy (feeling of commitment and belonging in personnel toward customers to such an extent that customers are convinced that the organization understands them and they are important to the organization) (8, 12, 13). Validity and reliability of the instrument to assess the quality of educational services in higher education in Iran were confirmed (7, 11). The 24-item SERVQUAL questionnaire is completed by students to measure expectations and perceptions about the status of

services based on a five-option Likert scale (from very low to very high expectations, and from very bad to very good perceptions). Answers ranged from very low to very high, and very bad to very good were scored from 1 to 5. Then, the mean scores of perception and expectation items in each dimension were considered as the scores of perception and expectations of that dimension. By subtracting the perception score from the expectation score, the score of the gap of educational services quality was calculated in each dimension. The positive score of the service quality gap indicated that the status perceived from the quality of educational services was higher than expectations, and the negative score indicated that the quality of the provided educational services was lower than expected. Also, in each dimension, the utility level of educational services quality was calculated by dividing the expectation score to the perception score and multiplying the result by 100.

To presentation of the results descriptively, percentages, tables, and charts were used. Comparison of the mean scores of different dimensions in terms of sex, marital status, and educational course was performed using independent *t* test; comparison of expectations and perceptions in each dimension was performed using paired *t* test, and comparison of expectations and perceptions with a specific value was performed using one sample *t* test. Also, comparison of the mean scores of different dimensions was performed using ANOVA and to determine the relationship between different dimensions Pearson correlation coefficient was used. Data were analyzed by SPSS version 22 (IBM Corporation, Armonk, NY). $P < 0.05$ was considered as the significant level.

4. Results

Of the 255 medical students that completed their internship and apprenticeship courses at the Community Medicine Department of Kerman University of Medical Sciences from April to March 2016, eleven subjects were excluded from the study due to unwillingness to participate in the study or incomplete filling of the questionnaire (the response rate was 95.7%). Of the 244 participants, 58.2% (n = 142) were female and 41.8% (n = 102) male, 57% (n = 139) were attending the internship and 43% (n = 105) the apprenticeship courses, 77.5% (n = 189) were single and the rest were married. The mean age of the participants was 24.3 $\pm$ 1.8 years.

According to the current study findings, the assurance and tangibles dimensions had the highest and lowest mean scores of expectations of the educational services quality (mean score 4.3 vs. 4.02),respectively. The mean scores of expectations in all dimensions except for the tangibles dimension ($P = 0.66$), were greater than 4 (the value four indicates high importance); there was a significant difference among the four dimensions ($P < 0.001$). There were no significant deferences between the mean scores of expectations of the quality of education in all five dimensions in terms of gender and course type (internship or apprenticeship) ($P > 0.05$).

The assurance dimension (mean = 3.74) had the greatest mean scores and the tangibles (mean = 3.36) and responsiveness (mean = 3.36) dimensions had the lowest mean scores of the perception of educational services quality respectively. There was a significant difference in the mean score of perception of educational services quality in all five dimensions with score 3 (the value three indicating the medium educational services quality) ($P < 0.001$).

The mean score of perception in reliability dimension in the students of internship course (mean = 3.70) was significantly higher than that of the apprenticeship (mean = 3.31) course ($P = 0.020$), but in the other four dimensions, the differences were insignificant in this regard. There were no significant difference of perception mean scores in all dimensions in terms of gender ($P > 0.05$).

From the students' point of view, the mean score of perception in all five dimensions of educational quality was significantly lower than expectation score, which indicated a negative gap in the quality of educational services in all dimensions. The greatest and lowest quality gaps were observed in the responsiveness (- 0.86) and assurance (- 0.59) dimensions. Also, the total score of the perception of the quality of educational services in the Department of Community Medicine was significantly lower than that of expectations (Table 1).

The mean scores of educational services quality gap based on sex and educational course did not show significant difference in any dimensions ($P > 0.05$). The utility of quality of educational services in the Community Medicine Department was 84.0% from the viewpoint of students. The highest level of utility of the educational services quality was observed in the assurance (86.4%) and empathy (86.1%) dimensions, and the lowest belonged to the responsiveness dimension (79.6%) (Figure 1). There was a positive and significant correlation between the scores of perception educational services quality at different dimensions. The lowest and highest correlations were observed between tangibles and assurance dimensions (correlation coefficient 0.486) and between empathy and assurance dimensions (correlation coefficient 0.708) (Table 2).

The mean scores of perception of all items (components) of assurance, responsiveness, empathy, and reliability were significantly lower than those of expectation mean scores. So, there were negative gaps in the educational services quality for the items. In the tangibles dimension, there was no significant difference between the mean scores of expectations and the perceptions in the item "well-dressed appearance of professors and staff", but

Table 1. Mean Scores of Perceptions and Expectations of the Educational Services Quality in the Department of Community Medicine from Students' Viewpoints

Dimension	Perceptions (Mean ± SD)	Expectations (Mean ± SD)	Gap	P-Value
Tangibles	3.36 ± 0.63	4.02 ± 0.65	- 0.66	< 0.001
Reliability	3.62 ± 0.65	4.27 ± 058	- 0.65	< 0.001
Responsiveness	3.36 ± 0.76	4.22 ± 0.63	- 0.86	< 0.001
Empathy	3.71 ± 0.62	4.31 ± 0.61	- 0.60	< 0.001
Assurance	3.74 ± 0.64	4.33 ± 0.62	- 0.59	< 0.001
Total	3.57 ± 0.55	4.25 ± 054	- 0.68	< 0.001

Table 2. Correlation Coefficient Between Different Dimensions of the Quality of Educational Services in the Department of Community Medicine[a]

Dimension	Reliability	Responsiveness	Empathy	Assurance
Tangibles	0.527[a]	0.495[a]	0.493[a]	0.486[a]
Reliability	1	0.692[a]	0.674[a]	0.620[a]
Responsiveness			0.561[a]	0.640[a]
Empathy			1	0.708

[a] P < 0.001.

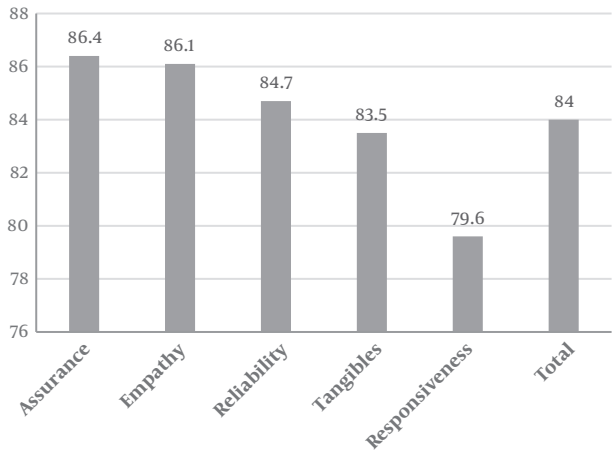

Figure 1. Utility rate of the quality of educational services in the Department of Community Medicine from the viewpoint of students

in other items of this dimension there were significant differences and negative gap in the quality of services (Table 3).

From the viewpoint of students, in the tangibles dimension, the "Professors and staff are well-dressed and have elegant appearance" (102.2%), had the highest level of utility and "Educational equipment are effective and modern" (72.2%) had the lowest level of utility.

In the reliability dimension, the item "Contents are presented to the students in an understandable manner" (88.0%) and "The educational content of each session is presented regularly and relevantly" (80.0%), had the highest and lowest levels of utility of educational services, respectively.

The items "professors introduce proper references to students for further studies" (91.8%) and "students have access to the advisors to share their comments and suggestions on educational issues" (76.9%) had the highest and lowest levels of utility of educational services, respectively, in the dimension of responsiveness.

In the dimension of empathy, the items "respectful treatment of the professor by the student" (95.7%) and "faculty members are flexible toward different conditions that may occur to the students" (74.1%) had the highest and lowest levels of utility, respectively.

In the dimension of the assurance, the item "sufficient specialized knowledge of professors" (95.1%) had the highest level of utility, and "preparing students for the future job by providing the necessary theoretical and practical educations" (76.7%) had the lowest level of utility (Table 3).

5. Discussion

The results of the current study indicated that the assurance and tangibles dimensions had the highest and lowest mean scores for expectations of the quality of educational services, respectively. In the studies performed at medical universities, the assurance dimension had the highest expectations score from the viewpoint of students. Therefore, assurance was the most important dimension in the quality of educational services from the students' viewpoint (6, 7, 10, 11, 14).This dimension reflects the competence and ability of staff in an organization to build a

Table 3. The Mean Scores of Expectations and Perceptions, the Levels of Utility, and Quality of Educational Services in the Department of Community Medicine at Kerman University of Medical Sciences

Dimension	Expectations (Mean ± SD)	Perceptions (Mean ± SD)	Service Gap	P-Value	Utility Level
Tangibles					
Facilities and physical space are apparently attractive	3.83 ± 0.87	3.33 ± 0.86	-5.0	< 0.001	86.9
Educational equipment are effective and modern	4.14 ± 0.79	2.99 ± 0.98	-1.15	< 0.001	72.2
Professors and staff are well-dressed and have Elegant appearance	3.99 ± 0.91	4.08 ± 0.79	0.09	0.110	102.2
Educational equipment are apparently attractive	4.14 ± 0.82	3.05 ± 0.96	-1.09	< 0.001	73.6
Reliability					
Students have easy access to study references	4.31 ± 0.81	3.71 ± 0.92	- 0.60	< 0.001	86.0
The educational content of each session is presented regularly and relevantly	4.31 ± 0.84	3.45 ± 1.06	- 0.86	< 0.001	80.0
Professors inform students of assessment results	4.01 ± 0.76	3.40 ± 0.88	- 0.61	< 0.001	84.7
Activities are performed by the professor at the promised time	4.18 ± 0.067	3.53 ± 0.99	- 0.65	< 0.001	84.4
Contents are presented to the students in an understandable manner	4.43 ± 0.74	3.90 ± 0.82	- 0.53	< 0.001	88.0
Students get higher scores if they make efforts on their studies	4.28 ± 0.74	3.67 ± 0.99	- 0.61	< 0.001	85.7
Responsiveness					
Professors introduce proper references to students for further studies	4.03 ± 0.93	3.70 ± 0.88	- 0.33	< 0.001	91.8
Supervisor and consultants are accessible by request	4.26 ± 0.73	3.41 ± 0.99	- 0.85	< 0.001	80.0
Students have access to the advisors to share their comments and suggestions on educational issues	4.26 ± 0.75	3.28 ± 1.00	- 0.98	< 0.001	76.9
Student comments and suggestions on educational issues are considered to curriculums	4.34 ± 0.80	3.09 ± 1.05	-1.25	< 0.001	89.8
Empathy					
Students are given the tasks based on educational contents	3.95 ± 0.87	3.50 ± 0.85	- 0.45	< 0.001	88.6
Faculty members are flexible toward different conditions that may occur to the students	4.41 ± 0.71	3.27 ± 1.09	-1.14	< 0.001	74.1
The timing of the classes is appropriate	4.21 ± 0.85	3.56 ± 1.02	- 0.65	< 0.001	84.5
In the educational environments, professors treat their students respectfully	4.45 ± 0.71	3.98 ± 0.97	- 0.47	< 0.001	95.7
Department staff respect for their students	4.48 ± 0.72	4.29 ± 0.76	- 0.19	< 0.001	89.4
Assurance					
Professors have sufficient specialized knowledge	4.54 ± 0.70	4.32 ± 0.81	- 0.22	< 0.001	95.1
Better learning occurs through sharing ideas about the topics of the lessons in the classrooms by the professors	4.34 ± 0.77	3.85 ± 0.91	- 0.49	< 0.001	88.7
Students are prepared for future jobs based on the theoretical and practical trainings	4.43 ± 0.74	3.40 ± 1.00	-1.03	< 0.001	76.7
Professors dedicate time to respond and explain the contents to students outside the classroom	4.16 ± 0.87	3.58 ± 0.91	- 0.58	< 0.001	86.0
There are sufficient references to increase students' specialized knowledge	4.22 ± 0.81	3.54 ± 0.90	- 0.58	< 0.001	83.8

sense of trust and confidence in students toward that organization (8). Considering the items of this dimension, benefitting from professors with adequate specialized knowledge, the possibility of discussion inside and outside the class, providing practical and theoretical training tailored to the future career of the students, and introducing sufficient references to increase the specialized knowledge were of the most important aspects of the quality of education (12, 13). The lower mean score of expectations in the tangibles dimension indicates that from the viewpoint of students, educational contents, methods, and atmosphere of educational processes are more important than facilities, educational equipment, and physical space. In various studies in Iran, inappropriate educational methods, inadequate time dedicated by the professors for teaching, and the inapplicability of the provided trainings were considered as the most important aspects of educational problems, which indicate their importance from the point of view of students (3, 4, 15).

Based on the results of the current study, the mean score of perception was lower than that of expectations in all five dimensions of educational services quality. The results of the studies in Hormozgan (14) and Guilan provinces (15) as well as Shiraz (16), Qom (17), Tabriz (11) and Urumia (10) also showed a negative gap in the quality of educational services in all five dimensions, which was consistent with the results of the current study. Studies in Thailand (18), Greece (19), and Bosnia and Herzegovina (20) also reported similar results. In new attitudes toward quality, meeting the demands and expectations of customers is one of the main aspects of the quality of the provided services (9, 14), Students are considered as the main customers of the higher education system in medical sciences universities, and assessing the quality of education from their viewpoint can identify educational expectations that are not adequately met, and contribute to effective planning to promote the quality (8, 9). However, the negative gap between the expectations and perceptions of the quality of educational services may be due to high and unrealistic expectations of students, but failure to meet students' actual expectations may reduce their academic motivation and satisfaction (8, 11).

In the current study, the highest negative quality gap was observed in the responsiveness dimension. The studies in Guilan (15), Kurdistan (21), Kermanshah (6), and Hormozgan (14) provinces also showed the same results. Students' access to professors for educational purposes, the possibility of transferring students' suggestions and opinions to managers, and considering student suggestions in making educational decisions were the main problems of this dimension in various studies (14, 17, 21). Making appropriate channels of communication with customers in order to get their opinions on the services and considering their viewpoints on the planning of educational services were of the important issues in the promotion of quality of services and customer satisfaction. Therefore, specific attention should be paid to customer- and student-centered educational services in medical sciences universities (9). The reason for the considerable gap in the responsiveness dimension reported in different studies on the quality of education in Iran can be due to the centrality of planning and policy-making in the Iranian higher education system; since usually customer-orientation and considering customers' expectations, communicating with them, and their contribution in planning are not seriously considered.

The results of the current study showed that the lowest negative gap in the quality of educational services belonged to two dimensions of assurance and empathy, respectively. The high mean score of perceptions and the low negative gap in the assurance dimension indicate the ability and competence of the professors to build a sense of trust and confidence in the students toward the provided trainings (12, 18). The assurance dimension indicates the professors' knowledge and their ability to build a sense of trust and intimacy in their students. Therefore, the high level of utility of educational services in this dimension indicates that there is a good atmosphere to transfer knowledge (8). Empathy dimension indicates paying special attention to the client and being sensitive to his needs (9). The low negative gap between expectations and perceptions of the quality of educational services and high level of utility of quality of this dimension indicate that professors and employees have a respectful attitude towards students and are interested in hearing their opinions and suggestions (8).

According to the results of the current study, the items "providing theoretical and practical training to prepare students for future careers", "using comments and suggestions of students in educational programs", "using advanced and up-to-date teaching equipment", "and flexibility of professors toward student's various conditions" had the highest negative gaps in the quality of educational services, respectively. In many similar studies, these items had a high negative gap (6, 10, 11, 15, 21). In a qualitative study in Iran, inapplicability of educations, inappropriate educational methods, improper use of teaching equipment, and lack of active contribution of students in the training process were of the educational problems reported by students (22). Other studies also reported the application of active teaching methods, appropriate educational facilities, the creation of appropriate learning opportunities, updating the educational contents, paying attention to the criticisms and suggestions of students, making proper relationship between theoretical and practical education, and the effective involvement of professors in practical

training as the most important items in the promotion of educational services quality and satisfaction of students (23-26). Therefore, reviewing educational contents, modifying educational methods, and enhancing the role and contribution of students in education are of the essential elements that should be considered in order to improve the quality of education.

The results of the current study showed that the utility level of the quality of educational services in the Department of Community Medicine was totally 84% and varied from 79.6% to 86.1% between responsiveness and assurance dimensions. Contrary to the educational services quality gap, which is the difference between perceptions and expectations and indicates the level of unmet expectations, the utility rate of services quality represents the met expectations. There are a number of problems in the educational departments of medical universities such as the high number of students, lack of faculty members, lack of students' sufficient motivation to learn, various duties of professors, the inadequacy of educational spaces, and the high number of patients (2, 27). It is essential to analyze the quality of educational services considering these problems and constraints. The utility level of the quality of services positively reflects the achievement of expected quality. Therefore, in service quality analysis, along with an analysis of the gap of services quality, there is an appropriate benchmark to assess the quality of educational services and an indicator to assess the achievement of goals in interventional programs to improve the quality of services.

5.1. Conclusion

According to the results of the current study, there were negative gaps in all dimensions of the quality of educational services in the Department of Community Medicine, which should be planned for quality improvement. In terms of items such as modifying educational content and tailoring trainings to future careers and the job market, reforming educational methods and more involvement of students in curriculums designing and updating educational facilities in quality promotion programs are of great concerns. Based on the analysis of the gap, responsiveness, tangibles, and reliability dimensions have higher priority for quality improvement, respectively. Given the positive correlation between different dimensions of quality and performing an intervention focusing on higher priority dimensions may improve the overall quality of educational services and result in the optimal use of resources. The results of the current study showed that the utility level of service quality can be considered complementary to the quality gap analysis to assess the quality of educational services and the evaluation of interventional programs.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

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Evaluation of the Task Compliance of Medical Education Development Centers from the Viewpoint of the Managers of the Centers

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Abstract

Background: Medical education development (MED) centers are established in order to improve the quality of medical education. It seems that after more than two decades since the establishment, the centers still have difficulties to perform some tasks.
Objectives: According to the important role of MED centers, the current study aimed at adapting the performances of such centers with their assigned tasks.
Methods: The current qualitative applied study was conducted in 2013. The statistical population of the study included managers of MED centers in Iran. Data were collected through a questionnaire containing open questions. During a national meeting the questionnaire distributed among 40 managers of MED centers and then analyzed using content analysis.
Results: More than half of the major functions that the managers stated, were referred to the first, second, and fourth tasks of the centers, and only 18% of the major functions were related to other tasks (11 cases). About 28% of the functions performed in such centers had no direct correlation with any of the 14 tasks.
Conclusions: Despite the history of MED centers for several decades, they are not justified in respect to their duties. It is recommended that guidelines be developed to address all duties and adequately monitor their implementation.

Keywords: Medical Education Development Centers, Performance, Indicator, Quality, Medical Education, Iran

1. Background

The capable staff and effective systems are the essential tools to provide acceptable levels of community health services (1). In recent years, in order to provide human resources to the health sector, an increase in the number of medical universities throughout Iran was put on the agenda. The main goal and mission of medical universities is to train qualified and competent staff that have the knowledge, attitude, and skills necessary to maintain and improve the health of the community (2).

Over the years, in order to increase the number of medical universities and to the extent that the number of these universities and graduates reached an acceptable level, due to the fact that many faculty members were not specialized in the teaching method, the quality of medical education was actually faced challenges (3).

The weakness in educational processes, coupled with tremendous evolutions in the advancement of technology and medical sciences over the past three decades, the need for greater changes in medical education was observed, which led to the first sparks of the establishment of medical education development (MED) centers aimed to qualitatively and quantitatively improve educational services at the national and academic levels (4). After establishing the first development centers in 1958 and 1959 in the United States and its extension to other countries, similar centers were also established in the Iranian health sector since 1990 aimed at improving the quality of education in medical universities (2, 4) and later, their number increased to such an extent that today, 45 medical universities affiliated to the Iranian Ministry of Health and Medical Education benefit from such centers, and they caused a tremendous evolution in the educational systems of medical sciences; in addition, the traditional view of faculty members in teaching also changed and the teachers came to believe that teaching is a kind of science and art (2). These centers, as the mastermind of the universities, are

responsible to promote the quality of education in the Iranian medical sciences and health services universities. To play this critical role, the existence of a permanent mechanism in colleges and educational-medical centers is required to extend education development activities to all levels of university education. Such centers mainly focus on the promotion of the quality of education in a variety of dimensions such as monitoring and coordinating educational programs, assessing new evaluation techniques, analyzing the examination results, comprehensive assessment of university staff, organizing and supervising students, supporting research in education, and coordinating and surveilling the education development offices in colleges and hospitals (5, 6).

In order to achieve such important goals, regulations are approved by the Iranian Ministry of Health, which describes the tasks of education development centers of medical education universities and their affiliated education development offices. According to such regulations, the development centers and their offices should perform the assigned tasks perfectly, but the results of the studies conducted in such centers show that they face challenges. For example, Momtazmanesh and Shoghi Shafagh Aria concluded in their study that despite significant changes and evolutions by the education development centers, inappropriate structure and organization, lack of funding, and inappropriate faculty members' payment system prevented such centers to perfectly play their roles in the promotion of the quality of education (2).

Many of the challenges were not under the control of the education development centers, but some of the problems with goal achievement were due to the mismanagement of the centers authorities, in such a way that many of the tasks in these centers are not performed accurately; some of them are paid excessive attention, while some others are neglected.

According to the goals of the education development centers, it is important to make sure that these centers are effective. Therefore, the formal evaluation of the performance of such centers is one of the critical steps for continuous improvement in medical education (7).

2. Objectives

The current study aimed at evaluating the major function of such centers in Iran from the viewpoint of their managers and comparing them with their duties specified in the regulations.

3. Methods

The current descriptive and applied study was conducted in 2013. The study population consisted of managers of MED centers participating in the annual conference of MED centers. The data collection tool was a questionnaire consisting of two open ended questions about the performance of such centers, developed by two experts in the field of medical education. The questionnaire items employed the open-ended style in order to let the managers point out the important activities performed in their centers, even the most detailed ones that sometimes were not even mentioned among the tasks defined by MED centers, without any prejudices. For this purpose and to evaluate the degree of adaptation of the activities performed in each center from the view point of the managers of centers compared to the defined tasks, a researcher-designed questionnaire using the opportunistic method was distributed among 40 managers of MED centers affiliated to medical sciences universities of Iran participating in an annual conference in 2013 in Tehran.

After collecting data, the research team members extracted the performance of the centers based on the questionnaires using content analysis method. Then, by reviewing the local duty regulations of MED centers, the functions in different areas extracted from the questionnaires in the previous stage were included in the regulation. Finally, for each extracted task and function, the frequency and percentage were determined. The study was approved by the Ethics Committee of Kerman University of Medical Sciences (ethical code: IR.KMU.REC.1396.33).

4. Results

In the current study, the major functions of MED centers were categorized as 14 main tasks and the ones that could not be attributed to any of the main tasks were assigned to "the others" class. Finally, for each task, the frequency (the number of people pointed to a certain function) and the frequency percentage were determined (Table 1).

4.1. Task 1

It focuses on guiding, coordinating, implementing, and monitoring the compliance and reviewing the educational programs emphasizing their accountability to community health requirements. Major functions that were recalled by the managers of MDC centers were responsive medicine, responsive training, lesson plan, planning, reviewing the faculty members' lesson plans, and providing feedback. In total, 15.2% of the functions performed by the centers can be categorized in this task group.

4.2. Task 2

It focuses on organizing, planning, implementing, and monitoring the enhancement of faculty members' capabilities in various fields of medical sciences education. In total, 21.4% of the functions performed by the Iranian MED centers can be classified in this group task. Some of the main functions performed by the center authorities, reported in the current study, were holding workshops and journal clubs, empowering faculty members, holding courses for professors, and enhancing professional ethics in different fields of medical sciences in universities.

4.3. Task 3

This task focuses on guiding and supervising the implementation of new educational and evaluation methods to develop and enhance the quality of education in universities. The data obtained from the data analysis showed that only one of such academic centers took a measure (in education quality improvement) regarding this task, or in other words, 0.9% of the major functions performed by the centers could be assigned to Task 3.

4.4. Task 4

This is involved in organizing, implementing, and monitoring the evaluation of faculty members and teaching-learning processes. About 17.8% of the major functions of the centers functions were in line with this task. The most important activities in this regard were to perform evaluations and modify faculty evaluation forms.

4.5. Task 5, 6, and 7

These tasks focus on guiding and monitoring the learner evaluation processes and the analysis of the results of the tests to improve the quality of exams (Task 5), guide and monitor the educational programs of the clinical skills learning center (CSLCs) of universities (Task 6), and organize and monitor the processes of identification, attraction, and growing brilliant talents (Task 7). Few activities were carried out on these tasks. In other words, 0.9% of the major functions performed by the centers were in line with each of these tasks.

4.6. Task 8

This task focuses on guiding, approving, funding, and monitoring the implementation of research projects in education. About 4.5% of major functions of MED centers were in line with this task. "Research in Education", an activity performed by these centers, was attributed to this task.

4.7. Task 9

The task focuses on guiding and supervising the distance learning and electronic learning programs of the university. About 4.5% of the major functions performed by the education development centers were in line with this task emphasizing "e-learning".

4.8. Task 10

This task consists of guiding, coordinating, facilitating, monitoring, and evaluating education scholarship activities based on the relevant regulations. The only activity performed by one of the centers in line with this task was to emphasize the education scholarship debate in the process of upgrading faculty members. In other words, 0.9% of the activities of the centers could be classified in this task group.

4.9. Task 11

It involves monitoring function and coordinating activities of affiliated education development offices. The activities carried out in this regard included the establishment of MED centers in hospitals and educational institutes. About 1.8% of the major functions of the centers were in line with this task group.

4.10. Task 12, 13, and 14

These tasks include providing advice on education at universities to authorities (Task 12), advising on the design and evaluation of university, continuing education programs (Task 13), and participating in meetings, councils, and committees according to the criteria and regulations (Task 14). The findings of the current study showed that not much measure was taken regarding these tasks. About 0.9% of the major functions were in accordance with Task 12 and 0.9% of the functions were in accordance with task 14; however, no action was taken regarding task 13, according to the authorities.

About 27.7% of the functions performed by these centers were not directly related to any of the 14 tasks approved by the Iranian Ministry of Health and Medical Education. These functions included the formation of committees, participation in the student Olympiads and Shahid Motahari Educational Festival, getting a journal publication license, establishment of a CSLC, participation in and leadership of the development of the strategic plan of the university, the development of a university scientific map and strategic plan, attracting the faculty members with a variety of specializations, medical education, high number of medical sciences graduates, strengthening students, specifically motivating them to participate in educational activities, development of postgraduate courses,

activation of all MED centers, assigning managers with related specialties, clear interaction between MED center and the vice-chancellor for research and education deputy, and the faculty tenure.

5. Discussion

Education development centers are launched to promote medical education. Education development programs in the main areas include research in education, teacher education, continuing education of graduates, and evaluating and monitoring the educational activities (3). The current study aimed at comparing the compliance of the major functions with the 14 approved main tasks in these centers and, owing to the broad scope of the tasks, addressing the major functions.

Most of the activities pointed out by experts were in Task 2 "organizing, planning, implementing, and monitoring the promotion of faculty capabilities". MED centers took some measures such as holding workshops, journal clubs, the faculty empowerment, and holding courses for professors to strengthen professional ethics in medical sciences. Since one of the goals of these centers is to strengthen the professors to train effective human resources, paying close attention to this task is of particular importance. All functions performed in this field somehow tried to enhance the scientific level of professors. Since many of the abovementioned functions, categorized in Task 2, have more objective and tangible aspects, many universities attempted to perform them.

The task ranked second and the center managers mostly pointed it out was "organizing, implementing, and monitoring the evaluation of faculty members and teaching-learning processes." Certainly, if there were a proper system to evaluate professors, they might have a higher motivation to improve their activities, which in turn improved the quality of education. The results of some studies show that consistent evaluations and correct feedback play an effective role in improving the quality of education (8-11). Through these measures- e. g. evaluating and modifying faculty evaluation forms- such centers tried to meet the objectives of the program.

The third rank task attracting a lot of attention was "guiding, coordinating, implementing, and monitoring the development and revision of educational programs, emphasizing their accountability to community health needs". Major functions performed in this task include responsive medicine, responsive training, lesson plan, planning, reviewing the faculty lesson plan, and providing feedback. Due to the importance of training programs, only their development and implementation is not enough, and this might be completed when appropriate supervision is also carried out.

As it was observed, more than half of the major functions indicated by the centers were related to tasks 1, 2, and 4, and only 18% of the index functions can be attributed to other tasks (11 cases). It is easy to understand that the focus of the centers was mostly on tasks 1, 2, and 4, and the frequency percentage of the other tasks was very small. This may be due to certain reasons, i. e. specifying a certain limit for any of the tasks (in other words, the centers did not believe in performing all the tasks), lack of knowledge and skills to perform other tasks, or paying less attention to other tasks. However, sufficient monitoring is required on the performance of these centers.

The document on accreditation standards of medical education and development centers states that "centers should have a specific program to evaluate the outcomes of their measures", but the evaluation of the activities of the centers is very difficult and the main problem is the difficulty to define development indicators (12). As a result, the difficulty of the evaluation process and the lack of adequate surveillance over the function of such centers lead to a lack of attention to all tasks. On the other hand, it was observed that about 28% of the functions performed by these centers were not in line with any of the fourteen tasks.

In a research conducted at Tehran University of Medical Sciences, most faculty members stated that addressing some of the side factors reduced the teaching role of faculty members, which in turn affects education as the main mission of the faculty. They also suggested that more attention should be paid to the quality of education (13). The study by Ranjbar and Vahidshahi also showed a decrease in the importance of the status of education and being a teacher for faculty members (14).

Certainly, all roles, tasks, and activities are carried out in the form of a coherent structure. One of the reasons for not focusing on many tasks seems to be the lack of a certain organizational chart and the lack of guidelines to assign time and activity to duties. Haghdoost et al. also considered the lack of a proper organizational chart as one of the major problems of MED centers. They also stated that "introducing a proposed framework by the organization of the MED centers and affiliated offices, respecting to the type of universities set by the headquarters is a solution to this problem" (15).

According to the results of the current study, after several decades of launching MED centers, they have not yet been justified regarding all of their assigned duties. It is recommended that guidelines should be provided in order to pay proper attention to all tasks and have adequate monitoring of their implementation. It is also possible to help such centers to meet their goals as much as possible

through determining the status of such centers in faculties and universities, determining the extent of minimum and maximum time to each task, determining the importance of each task, and defining the activities necessary to perform each task.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

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Table 1. The Compliance of the Major Functions of the Medical Education Development Centers with the Duty Regulations

	Main Tasks and Activities of MED Centers of Universities	Major Functions from the Viewpoint of the Managers of the Centers	Frequency[a]	
			Individuals Pointing to the Topic	Total Frequency Mentioned by Individuals in Each Area
Task 1	Guiding, coordinating, implementing, and monitoring the development and revision of educational programs, with emphasis on their accountability to the health needs of the community covered by the university within the limits of university authority, in accordance with the rules of the Supreme Council of Planning	Accountable medical education	2 (1.8)	17 (15.2)
		Accountable medical education	2 (1.8)	
		Lesson plan	8 (7.2)	
		Planning	4 (3.6)	
		Evaluating the lesson plan of faculty members and providing feedback	1 (0.9)	
Task 2	Organization, planning, implementing, and supervising the promotion of faculty members' capabilities in different fields of medical education	Workshop	13 (11.7)	24 (21.4)
		Journal club	1 (0.9)	
		Empowering the faculty	8 (7.2)	
		Holding courses for professors	1 (0.9)	
Task 3	Guiding and monitoring the implementation of new educational and evaluation methods to develop and enhance the quality of education at universities	Taking measures in order to improve the quality of education	1 (0.9)	1 (0.9)
Task 4	Organizing, implementing, and monitoring the evaluation of faculty members and teaching-learning processes	Evaluation	19 (16.9)	20 (17.8)
		Modifying faculty evaluation forms	1 (0.9)	
Task 5	Guiding and monitoring the evaluation process of learners and analyzing the results of exams in order to improve the quality of tests	A serious test analysis at the university	1 (0.9)	1 (0.9)
Task 6	Guidance and supervision of educational programs at CSLCs of University	Standardized Patient unit at the councils and decision-making bodies of the university	1 (0.9)	1 (0.9)
Task 7	Organizing and monitoring the processes of identification, attraction, and growing brilliant talents	Making active the office of brilliant talent recognized by professors and students	1 (0.9)	1 (0.9)
Task 8	Guiding, approving, funding and supervising the implementation of research projects in education	Research in education	5 (4.5)	5 (4.5)
Task 9	Guiding and monitoring distance learning and e-learning programs of the university	E-learning	6 (5.4)	6 (5.4)
Task 10	Guiding, coordinating, facilitating, monitoring, and evaluating scholarship activities based on the relevant regulations	Emphasis on the scholarship debate in teaching in the process of faculty tenure	1 (0.9)	1 (0.9)
Task 11	Monitoring the performance and coordinating the activities of affiliated subsidiary development offices	Establishment of educational development centers for hospitals and educational institutes	2 (1.8)	2 (1.8)
Task 12	Providing advice on educational issues to authorities	Thought room of the Deputy of Education	1 (0.9)	1 (0.9)
Task 13	Providing advice on the design and evaluation of continuing education programs	-	-	-
Task 14	Participation in meetings, councils, and committees based on rules and regulations	Active participation in the councils and university decision-making bodies	1 (0.9)	1 (0.9)
	Others	Forming committees	7 (6.3)	31 (27.7)
		Participation in student Olympiad, Shahid Motahari Educational Festival	6 (5.4)	
		Getting a journal publication license	4 (3.6)	
		Establishing a CSLC	1 (0.9)	
		Participation in and leadership of the development of the strategic plan of the university	1 (0.9)	
		The development of a scientific map and strategic plan for Kerman University of Medical Sciences	1 (0.9)	
		Attracting the faculty members with a variety of specializations for participation	2 (1.8)	

		Medical education, high number of medical sciences graduates	1 (0.9)	
		Strengthening students, specifically motivating them to participate in educational activities	3 (2.7)	
		Development of postgraduate courses	1 (0.9)	
		Activation of all MED centers	1 (0.9)	
		Assigning managers with related specialties to the centers	1 (0.9)	
		Clear interaction between MED center and the Vice-Chancellor for Research and Education Deputy	1 (0.9)	
		Faculty tenure	1 (0.9)	
Total			100	100

Abbreviation: MED, medical education development.
[a] Values are expressed as No. (%).

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Published online 2018 November 5. **Research Article**

The Relationship Between Basic Psychological Needs and Academic Burnout in Medical Students

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Abstract

Background: Academic burnout has several negative consequences such as decreased motivation, academic eagerness, and achievement among students.
Objectives: The current study aimed to investigate the relationship between basic psychological needs and academic burnout.
Methods: The current descriptive-correlational study was conducted among 233 students of Kashan University of Medical Sciences (140 females and 93 males) selected through stratified multistage sampling in the second semester of the 2016 - 2017 academic year. The participants responded to Breso Academic Burnout and Gagné Basic Psychological Needs questionnaires and provided their demographic information. Data were analyzed using SPSS (Version 22) using canonical correlation analysis.
Results: There was a significant negative correlation between academic burnout and autonomy ($r = -0.296$, $P < 0.01$), competence ($r = -0.548$, $P < 0.01$), and relatedness ($r = -0.290$, $P < 0.01$) needs. Canonical correlation coefficient was 0.61. The results of canonical analysis showed only one significant set of basic psychological needs and components of burnout. In addition, as psychological needs, especially the competence need, were satisfied more, the probability of academic burnout, especially in the academic inefficacy dimension, as the main component of academic burnout, was reduced.
Conclusions: The fulfillment of basic psychological needs, especially competence need, plays an important role in preventing academic inefficacy among students. Fulfilment of basic psychological needs in educational programs could be a protective factor against students' academic burnout and improve their academic performance.

Keywords: Basic Psychological Needs, Academic Burnout, Medical Students

1. Background

Students face several negative challenges in achieving academic success in their educational environment, which could possibly produce adverse effects on their motivation, academic achievement, and psychological well-being. One of the most important challenges is the academic burnout (1). Although burnout studies were primarily limited to helping occupations or vocational training of health workers or school teachers over the last few decades, more recent studies have also focused on the educational settings and defined the concept of academic burnout which has both theoretically and practically attracted considerable attention among researchers (2). Until recently, studies on students' burnout have been limited to supervisory and advisory roles such as research and teacher assistants (3). Academic burnout among students comprises three components including feelings of tiredness due to educational demands and requirements (exhaustion), pessimism and lack of interest in tasks (cynicism), and inadequacy as a student (inefficacy) (4). Academic burnout is a reaction to chronic stress due to academic requirements, caused by the discrepancy between students' performance and their expectations about their academic achievement (5). Academic burnout has increased over the past years and led to many negative consequences such as academic inefficacy, depression, etc. (6). Since academic burnout influences learners' enthusiasm and motivation and has harmful consequences such as reduced academic performance (7), the study of its contributing and exacerbating factors is one of the most important research areas in educational environments, which could possibly help to understand students' academic performance.

Previous research has investigated various contributing factors to academic burnout such as perfectionism and

achievement goal-orientation, social support, emotional intelligence, resilience, anxiety and emotional deficiency, self-esteem, and hope. However, there is scanty research on the unfulfillment of basic psychological needs as a key factor leading to burnout. The theory of basic psychological needs introduces three innate, universal psychological needs including autonomy, competence, and relatedness. The need for autonomy means an individual's need for self-regulation, self-organization of experiences and behaviors, engagement with personal activities, as well as the need for choice and self-initiation and the feeling of obligation to perform a particular task (8). The need for competence reflects the need to be effective in interactions and communication with the environment, indicating the desire to use talents and skills in pursuing optimal solutions (9). Finally, the need for relatedness refers to the sense of security in communication with others and finding oneself worthy of love and respect. The fulfillment of these needs is essential for mental health in a wide range of cultural contexts. If basic psychological needs are met, self-esteem could develop; otherwise, individuals might experience a fragile, negative, and critical perception about themselves (10).

The results of previous studies show a negative relationship between the satisfaction of basic psychological needs and burnout. For example, Van den Broeck et al. found that there is a negative relationship between satisfaction of basic psychological needs, fatigue, and burnout (11). In academic environments and universities, in particular, students' mental health is negatively affected due to high competition and demands for education and lack of attention to psychological factors, which gradually leads to academic burnout. Burnout is one of the factors that decreases students' motivation to perform academic tasks and prepare for exams. Motivation is an important factor for academic achievement, and individuals with more internal motivation reportedly experience less academic burnout; therefore, enhancing students' internal motivation could reduce their academic burnout (12). On the other hand, addressing basic psychological needs plays an important role in improving students' internal motivation (13), which reduces their academic burnout.

Academic burnout plays a crucial role in students' mental health and academic performance. Numerous studies have reported the negative effect of academic burnout on academic variables such as achievement, eagerness, and engagement (5) as well as students' health variables including mental health (14) and perceived stress (15). Hence, further research should address contributing factors to academic burnout and suggest solutions to overcome it. However, our literature review reached few studies investigating basic psychological needs in education, most of which have been conducted in occupational contexts. Moreover, no systematic study has explored the role of basic psychological needs in students' academic burnout in the Iranian context. Therefore, the current study aimed to investigate the relationship between basic psychological needs and academic burnout among students.

2. Methods

The current descriptive-correlational study was conducted to find out the variations of some criterion variables of the 'burnout components' based on 'psychological needs' as predictors. Since the criterion variable is a three-variable set of burnout components theoretically related to each other and form a set called academic burnout, regression analysis could not be used in this case (16). Therefore, the canonical correlation analysis was used to investigate the relationship between psychological needs and academic burnout. The statistical population of the study included all students of Kashan University of Medical Sciences in the second semester of the 2016 - 2017 academic year. According to the Cochran formula, 233 students (140 females and 93 males) were selected using stratified multistage sampling (gender-specific) method. Therefore, we randomly chose two faculties, namely, 'nursing and midwifery' and 'medicine', and then we randomly selected 10 classes from each faculty, and from each class, 10 - 12 students. Since about 60% of the students were female, this proportion was also retained in sample selection. Participants completed the Persian versions of Gagné Basic Needs Satisfaction in General Scale (BNSG-S) and Breso Academic Burnout questionnaire and also provided their demographic information as well as their total grade point average (GPA). The questionnaires were completed individually. The oral consent of all subjects was obtained, and they were also assured about the confidentiality and anonymity of their answers. The participants were given sufficient time to complete the questionnaires. Data were collected over three weeks and analyzed using correlation analysis in SPSS (version 22, IBM Corporation, Armonk, NY).

The Breso Academic Burnout questionnaire was used to measure students' academic burnout. This questionnaire was developed in 1997 by Breso et al. and measures the three components of academic exhaustion, cynicism, and inefficacy. This 15-item questionnaire is scored based on a five-point Likert scale from completely disagree to completely agree. The total score of the instrument ranges from 15 to 75. In this questionnaire, the academic exhaustion includes five items (e.g., lessons are boring), academic cynicism four items (e.g., I do not like the content of the lesson), and academic inefficacy six items (e.g., I feel I cannot

overcome learning problems). The reliability of each section has been reported as 0.70, 0.82, and 0.75, respectively (17). Also, Azimi et al. reported the Cronbach's alpha coefficient of the whole questionnaire as well as its three components as 0.85, 0.61, 0.68, and 0.58, respectively (18). In the current study, the reliability coefficients for each component were calculated as 0.79, 0.82, and 0.72, respectively.

In order to measure basic psychological needs, the Gagné Basic Psychological Needs questionnaire was employed. To develop this questionnaire, Gagné adapted the scale of fundamental needs. This scale consists of three subscales of autonomy, competence, and relatedness and measures satisfaction of basic psychological needs at the general level. This scale has a total number of 21 seven-point Likert scale items. A higher score in each subscale indicates more fulfillment of the basic psychological needs. Besharat and Ranjbar validated the Persian version of this scale with a group of Iranian students and reported good validity and reliability for this scale. The Cronbach's alpha coefficient for the subscales of autonomy, competence, and relatedness were 0.89, 0.87, and 0.91, respectively (19). In the current study, the Cronbach alpha reliability coefficients for the three components were 0.63, 0.67, and 0.70, respectively.

3. Results

The mean academic burnout scores for male and female students were 41.13 $\pm$ 9.80 and 41.19 $\pm$ 10.51, respectively. Among the female students, the mean scores of autonomy, competence, and relatedness needs were 34.18 $\pm$ 6.35, 27.84 $\pm$ 5.57, and 38.37 $\pm$ 5.57, respectively, while for the male students; they were 51.5 $\pm$ 34.26, 29.65 $\pm$ 5.17, and 39.53 $\pm$ 6.67, respectively. According to independent samples t test results, there was no significant difference between male and female students in terms of academic burnout (t = 0.437, P = 0.966), autonomy need (t = 0.103, P = 0.918), and relatedness need (t = 1.315, P = 0.190), but the mean of the competence need among females was significantly higher than that of males (t = 2.490, P = 0.013).

Students' age had no significant relationship with autonomy (r = 0.44, P = 0.500), competence (r = 0.50, P = 0.450), and relatedness (r = -0.003, P = 0.950), but there was a significant relationship between age and academic burnout (r = 0.153, P = 0.02). Table 1 shows descriptive indices (mean and standard deviation) and correlation coefficients between all variables.

According to Table 1, there was a significant negative correlation between all basic psychological needs and academic burnout components. This indicates the more students' basic psychological needs are fulfilled, the lower their academic burnout would be. The canonical correlation analysis was used to investigate the relationship between the set of basic psychological needs (autonomy, competence, and relatedness) and academic burnout components (academic exhaustion, cynicism, and inefficacy). Table 2 presents the results of canonical correlation analysis.

Based on the results of Table 2, χ^2 was significant only for the independent and dependent variables of the first set, and the first set of basic psychological needs could significantly explain 0.61 of the variance of the academic burnout set.

Table 3 shows the canonical weights of the first significant set of dependent and independent variables.

As shown in Table 3, in the first set, the competence need and academic inefficacy were of great importance. The amount of variance extracted by the canonical variable of the first set (basic psychological needs) was 54.6%, and the amount of variance extracted from the canonical variable of academic burnout was 54.9%. The basic psychological needs explained 20.9% of the changes in academic burnout. To identify significant variables in sets or canonical variables, Tabachnick and Fidell suggested that the canonical loads which are $\geq$ 0.30 could be considered significant in the related set (20). Therefore, it could be concluded that as the fulfilment of the competence, autonomy, and relatedness needs increases, academic exhaustion, cynicism, and inefficacy decrease (Table 3).

4. Discussion

Academic burnout is the result of overexposure to permanent stressors in educational environments, which could possibly lead to academic burnout in the long run (21). The current study aimed at investigating the relationship between the fulfillment of basic psychological needs and academic burnout. The results showed a negative correlation between the satisfaction of basic psychological needs, especially the need for competence, and burnout, particularly the academic inefficacy component. This finding is consistent with the results of studies by Li et al. (22), Hodge et al. (23), and Bentzen et al. (24). According to a study by Sulea et al., fulfillment of basic psychological needs has a positive correlation with academic engagement and a negative correlation with exhaustion and academic burnout (25). To explain this finding, it could be said that when students experience low levels of choice and psychological freedom, they do not feel competent and cannot communicate with others and experience dissatisfaction, low energy, and fatigue. In a study by Li et al., a negative relationship was observed between the satisfaction of athletes' basic psychological needs and their

Table 1. Descriptive Indices and Matrix of Correlation Coefficients[a]

Variable	Mean ± SD	1	2	3	4	5	6
Need for autonomy	34.21 ± 6.02	1					
Need for competence	28.56 ± 5.47	0.615**	1				
Need for relatedness	38.84 ± 6.62	0.497**	0.492**	1			
Academic exhaustion	13.61 ± 4.15	-0.151*	-0.352**	-0.167*	1		
Academic cynicism	10.69 ± 4.00	-0.199**	-0.387**	-0.203**	0.725**	1	
Academic inefficacy	6.84 ± 4.24	-0.366**	-0.590**	-0.332**	-0.334**	0.418**	1
Total score of academic burnout	41.15 ± 10.07	-0.296**	-0.548**	-0.290**	0.841**	0.873**	0.726**

[a] *P < 0.05; **P < 0.01.

Table 2. Relationship Between the Sets of Basic Psychological Needs and the Academic Burnout Using Canonical Correlation Analysis

First Set	Eigenvalue	Canonical Correlation	Wilks' Lambda	χ^2	Df	P Value
1	0.614	0.617	0.614	13.60	9	< 0.001
2	0.008	0.089	0.992	0.450	4	0.766
3	0.0004	0.006	0.999	0.008	1	0.926

Abbreviation: Df, degree of freedom.

Table 3. Correlation, Canonical Standardized Coefficient, and Explained Variances for the First Set of Predictive and Criterion Variables

	Correlation Coefficient	Standard Canonical Coefficient
Predictive variables		
Autonomy need	0.58	-0.07
Competence need	0.99	0.99
Relatedness need	0.54	0.09
Percentage of extracted variance	54.60	
Covariate	20.79	
Criterion variables		
Academic exhaustion	0.57	-0.19
Academic cynicism	0.63	-0.14
Academic inefficacy	0.95	-0.83
Percentage of extracted variance	54.92	
Covariate	20.91	

burnout. Moreover, the need for competence and autonomy, as compared with relatedness need, were stronger predictors of burnout (22). Also, the results of a study by Hodge et al. showed that people with higher levels of burnout reported less satisfaction of their basic psychological needs, especially competence and autonomy (23). This order of important psychological needs is similar to that of the present study. Also, in a study by Sullivan et al., there was a strong correlation between competence and all three components of burnout (26).

The inverse relationship between basic psychological needs and burnout can be explained through the theory of self-determination based on which the theory of basic psychological needs is derived. According to this theory, satisfaction of basic needs is positively related to the internal motivation. On the other hand, dissatisfaction of basic psychological needs increases students' amotivation. According to the results of Zhang et al., students with higher scores in internal motivation show less academic burnout (4). The results of a study by Domenech-Betoret et al. showed that satisfying basic needs increases students' academic engagement (27) and, consequently, reduces their academic burnout (7). The results of the current study indicated that satisfaction of autonomy and competence

needs increases learners' well-being. Among basic psychological needs, the need for autonomy, competence, and relatedness are the strongest predictors of students' mental well-being, respectively (28); on the other hand, there is a strong correlation between satisfaction of basic psychological needs and well-being which is the opposite of burnout (29).

In general, the results of the current study supported the usefulness of self-determination theory in educational environments. Niemiec and Ryan found that independence, personal abilities (competence), and safe interpersonal relationships were important educational tasks (8). Additionally, meeting students' basic psychological needs had a significant relationship with better learning outcomes and greater investment in time and energy for academic activities. In this regard, it can be argued that satisfaction of basic psychological needs via improving learners' academic performance leads to a reduction in their academic burnout (7). People with fulfilled psychological needs are more motivated than others to perform educational tasks and engage in interesting or enjoyable activities (30). In contrast, unfulfillment of needs impedes learners' development, results in the reduction of well-being, and increases emotional exhaustion (31), which could be due to the fact that when basic psychological needs are not satisfied, optimal and desired motives are neutralized (11) and the individual participates in activities to avoid punishment or obtain rewards.

The teacher's support for learners' autonomy seems to help learners better meet their basic psychological needs. These individuals, in comparison with others whose teachers are controlling, have higher competence, inner motivation, and better academic performance. Educational environments emphasizing friendship, communication between members, and mutual respect and have high quality educational services can increase the sense of coherence, autonomy, and competence among learners. Improving the culture of educational environments and the teachers' support for the autonomy of students can facilitate the fulfilment of students' basic psychological needs, leading to decreases in academic burnout (27). Accordingly, Salmela-Aro et al. stated that the school atmosphere and the positive motivation received from teachers had a negative relationship with academic burnout. This could be justified by the fact that the atmosphere prevailing in educational environments can increase or decrease academic burnout through satisfying students' basic psychological needs, because according to the self-determination theory, perceived satisfaction of basic psychological needs is influenced by the social environment (32).

4.1. Conclusion

Since previous research findings showed a negative relationship between educational environments' atmosphere, in terms of satisfaction of basic psychological needs, and burnout, teachers can facilitate students' satisfaction of their basic psychological needs by creating a supportive and challenging environment for students. This can be achieved by explaining the purpose and significance of learning activities, encouraging students to select appropriate academic activities, engaging them in skill-building projects, and providing them with sufficient resources. Students' need for independence can be met by providing them with opportunities to conduct study projects. Teachers can support students' need for competence by creating challenges, setting achievable goals, and providing support and positive feedback for students. Students' need for relatedness can be met when teachers show acceptance, understanding, and attention. Teachers should respond to and develop this need by giving students ample opportunities for team-work. Thus, by recognizing students' basic psychological needs and trying to meet them in educational environments, it is possible to some extent to compensate for the destructive effects of the lack of proper satisfaction of these needs in family and provide a better basis for the individual's academic achievement. As a result, reducing academic burnout can improve students' achievement in different scientific fields.

4.2. Limitations

The study samples were limited to the students of Kashan University of Medical Sciences; therefore, care should be taken in the generalization of the results of the present study. Moreover, since the design of the current study was correlational, no cause-and-effect relationships between basic psychological needs and academic burnout could be inferred. In addition, due to paucity of previous research, other potential intervening factors were not investigated. Also, the current study was quantitative; thus, it is suggested that future studies use qualitative data collection techniques such as deep and semi-structured interviews in order to obtain more conclusive results.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Published online 2019 March 2. **Research Article**

Evaluation of the Impact of Courses on Islamic Education and Religious Concepts on the Promotion of Medical Ethics: A Case Study on the Students of Kerman University of Medical Sciences

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Abstract

Background: According to the status of ethics in medical education and owing to the students' talent and rational spirit, it seems that the education system, despite the emphasis on courses such as medical ethics, should focus on the improvement of teaching quality of Islamic education and explanation of religious concepts, since emphasis on increasing the quality of Islamic education leads to the promotion of medical ethics.
Objectives: The current study aimed at evaluating the impact of courses on Islamic education and religious concepts on the promotion of medical ethics among the students of Kerman University of Medical Sciences, Kerman, Iran.
Methods: The current descriptive cross sectional study was conducted on 5831 students of Kerman University of Medical Sciences as the statistical population in the academic year of 2016 - 2017. Using the Morgan table, 360 subjects were selected as the study sample using stratified random sampling method. In order to collect data, a standard questionnaire, which its reliability was confirmed by Cronbach's alpha coefficient, was used. Data were analyzed using structural equation modeling with AMOS software.
Results: Structural equation modeling was used to analyze the data and test the hypotheses. The models could explain the measurement indices, and based on the adopted method, the fitting indices of the measurement models showed the acceptability of the measurement models for Islamic education, religious concepts, and medical ethics.
Conclusions: In addition to the content-related relationship with medical ethics, the Islamic education promotes ethics in the target community and has a direct impact on the education of medical ethics. Also, the explanation of religious concepts has a major impact on the promotion of the quality of medical ethics, since religious concepts, as students' subjective presuppositions, help them to better understand the content of medical ethics. By the evaluation of the research hypotheses, a direct relationship was observed between the education of Islamic education and promotion of medical ethics. Accordingly, a relationship between the religious concepts and the promotion of medical ethics was also confirmed. The course of Islamic education has a lower impact on medical ethics compared with that of religious concepts. The attention paid by the medical education system to the results of data analysis leads to an increase in the quality of Islamic education course offered to the students.

Keywords: Islamic Education Religious Concepts, Medical Ethics, Medical Students

1. Background

The medical sciences have a high degree of sanctity and virtue in various schools; in the Holy Quran Allah explicitly refers to the sacredness of medical sciences, and says: "...and if any one saved a life, it would be as if he saved the life of the whole people..." [The Holy Quran. Ma'ideh, 32]. The fact is that physicians in the Islamic community, in addition to high scientific degree, enjoy a spiritual and moral status and are always struggling to maintain moral principles and values, and they are a model for people in terms of science and practice. Therefore, the high place of medical sciences should be acknowledged and considered as the main sciences. As the Prophet (pbuh) says: "Knowledge is of two kinds; religious sciences and medical sciences" (1).

Medical sciences, with such a degree of importance, are composed of numerous theoretic and practical fields, which medical ethics is one of them. Medical ethics, as a branch of professional ethics, tries to apply moral principles into practice through a relationship between the physician and the patient and make medical decisions

based on ethics. In other words, medical ethics can be introduced as a science compatible with medical sciences, relied on the advancement of the medical system. Ethical sciences tries to examine a set of do's and don'ts and analyze good or bad behaviors, and all the people involved in clinical or medical practices should observe them. Therefore, medical ethics is the morality in medical behaviors (the opinions of the authors).

Ethic originates from the term "etiquette". According to the terminology, the term "medical ethics" means the medical practice in the relationship between the physician and the ones interacting with him (2). Modern medical ethics, in fact The process involves an analytical activity in which thoughts, beliefs, obligations, behaviors, feelings, arguments, and discussions in ethical decisions are carefully and critically examined. The ethical decision in medicine discusses clinical practices, axioms, and values, good and bad, correct and incorrect, and do's and don'ts (3).

Medical ethics is one of the branches of professional ethics that apply moralities into physicians and medical staff practice as well as ethical decisions in medicine. In other words, medical ethics is a matter of science examining a set of acceptable or unacceptable behaviors that clinicians should follow. Therefore, medical ethics is the morality in the scene of medical practice (4). Medical ethics, in the theoretical aspect, explains the underlying principles of this science, describes the existing ethical hypotheses and its relationship with the cultures, religions, and customs of different societies. In practical terms, based on theoretical principles, it discusses matters, problems, and ethical issues in medicine and health care, and provides an applied framework for critical decision-making. Medical ethics is related to moral philosophy, human rights, divine law, and civil law (5).

Some believe that professional ethics are part of applied ethics and address the ethical challenges experienced by health care workers. Such kind of ethics may cause situation; for example, the situation of the medical profession; although it is contrary to the applied ethics that only discuss ethical norms in practical and applied cases (6, 7).

The issue of medical ethics in modern medicine, with regard to rapid development of medical sciences, is of great importance. In the era of medical knowledge expansion, the creation of new technologies and the emergence of modern therapeutic and diagnostic methods as well as technological advances, medical sciences encountered new ethical issues; therefore, traditional medical ethics somewhat lost its effectiveness (8). Therefore, it is imperative that medical ethics conform to the knowledge and technology of medicine to such an extent that during advancement and promotion, the medical community does not far from the ethical principles. The first step to observe ethical principles is to have moral knowledge and gain the ability of moral reasoning.

From the perspective of a dynamic school such as Islam, the medicine is a humanitarian and religious responsibility. Of course, this does not mean that the physician should not earn for his work, but should, along with his professional activities, provide the patient and his companions' peace of mind. Another manifestation of professional ethics in medicine is the proper interaction of the medical staff with each other. Such interaction also makes patients experience their recovery period in a relaxed atmosphere away from tensions. Beauchamp and Childress (9) and Manojlovich et al. (10) argued that: "The relationship between physician and nurse is defined as a mutual interaction in patient care to achieve common therapeutic goals. Such relationship is considered as a pivotal and ethical component in the health system, which can have different effects. The proper relationship between the members of a team improves health care practices and reduces the hospital stay period" (the opinions of the authors).

The interaction between the physician and nursing staff can provide peace of mind for the patient and his relatives, which is the ultimate goal of the physician; such interaction is of great importance to such an extent that some Western scholars believe that the advancement of medical sciences is indebted to the relationship between medical ethics principles and religious teachings (11).

In the context of the relationship between medical ethics and courses on Islamic education, a lot of commonalities can be mentioned including the fact that both topics contain valuable tips in educational ethics and the promotion of human values that can encourage humans to shift from self-determination attitudes to sacrifice and devotion, and help to maintain and promote health, treat diseases, and improve the relationship between the physician and the patient. Courses on medical ethics and Islamic education may be used as parallel learning, which can complete and eliminate each other's potential defects. For example, if there are irresponsive doubts in matching topic of medical ethics between the Western and Islamic worlds, various examples can be found referring to Islamic texts, such as Quran interpretation and narrations (the opinions of the authors).

Regarding the two dependent variables (teaching Islamic education and religious concepts) and an independent variable (the promotion of medical ethics), there are some studies that can be used as a background to the current study (the opinions of the authors). Some studies noted the direct relationship between Islamic concepts, and professional and medical ethics; for instance, Hoseini

et al. concluded in their study that Islam is provided indicators for medical ethics, which accordingly divine dignity, and feeling of responsibility for themselves, God, and society, as well as divine motivation and spiritual pleasures should be observed in practices; such variables can be the best guarantee of the implementation of ethical principles in the medical profession and can help medical staff to get rid of doubts in decision-making and implementation of their projects, compensate for the shortages of other moral schools based on human demands, worldly pleasures, and even improve human mechanical life (12). Shomali and Momeni in a study comparing Islamic and Western sources about the basics and theories of principal ethics concluded that some of the ethical principles governing Islamic or Western thoughts influence medical decision making and any other medical practices. Therefore, there is a fundamental difference between Islamic and non-Islamic (Western) medical ethics principles in terms of basics and contents, and it is necessary in Islamic countries to compile ethical principles based on Islamic worldview, jurisprudence, and philosophy and apply them in medical centers (13).

Teaching Islamic education has a strong correlation with the principles of medical ethics and increasing the quality of the aforementioned courses can directly influence the promotion of medical ethics (the opinions of the authors) (Hypothesis 1). Also, teaching and conveying religious concepts correlates with the concepts of medical ethics and affects the promotion of medical ethics quality (Hypothesis 2) (the opinions of the authors).

Therefore, it is necessary to prove these hypotheses through one or more statistical populations associated with university education and evaluate the extent of affinity between educational contents of Islamic education and moral knowledge, as well as the impact of religious texts and concepts and Islamic education on ethical promotion in order to identify and eliminate the existing challenges and exigent requirements to improve the quality of courses on Islamic education in medical education system.

2. Methods

The current descriptive cross sectional study was conducted on 5831 students as the statistical population studying at Kerman University of Medical Sciences in the academic year of 2016 - 2017. A total of 360 subjects were recruited based on the Morgan table (14) as the study samples using stratified random sampling method. Before initiation of the study, the study objectives were explained to the students and they were assured about the confidentiality of their information. Participation in the study was voluntarily.

In the present study, a comprehensive questionnaire was developed using the contents of "Islamic education textbooks", "religious concepts" and "promotion of medical ethics" (15-17); the questionnaire was distributed among the subjects. The reliability of each tool was 0.91, 0.83 and 0.78, respectively, based on Cronbach's alpha coefficient (18). The reliability of the comprehensive questionnaire, which included the contents of all the three topics, was confirmed (0.84). The standard questionnaire included eight items in Islamic education textbook, six items in religious concepts, and six items in promotion of medical ethics, scored based on a five-option Likert scale; the subjects should rank their suggested options from 1 (completely disagree) to 5 (completely agree). In order to reach data saturation, 390 questionnaires were distributed of which 365 were returned and used for analysis; the response rate was 93.5%.

Data were analyzed using structural equation modeling algorithm in AMOS version 24. Structural equation modeling is a very general multivariate analysis technique belonging to the multivariate regression family and, more precisely, is the general linear model extension, which lets the researcher examine a set of regression equations simultaneously. The equation modeling is a comprehensive approach to test the hypotheses on the relationships among manifest and latent variables; structural analysis of covariance is also called casual modeling, but the prevailing term is the structural equation modeling. The accepted values of goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), the comparative fit index (CFI), and normal fit index (NFI) are higher than 0.90, and values above 0.95 indicate model fitness (19).

3. Results

In order to evaluate the model's fitness, structural equation modeling was employed. Figure 1 illustrates the impact of teaching Islamic education and religious concepts on the promotion of medical ethics.

Figure 1 and Table 1 show the results of the direct impact of variables on each other in the general model. Based on Figure 1, the impact of teaching Islamic education and religious concepts on the promotion of medical ethics was direct and significant.

Participants' demographic characteristics such as gender, age, and educational status are presented in Table 2.

Fit indices showed that the employed models were acceptable to measure courses on Islamic education, religious concepts, and medical ethics. The general fit indices of the measurement models are given in Table 3.

According to Table 3, the measurement models had good model fitness. In other words, the general indices

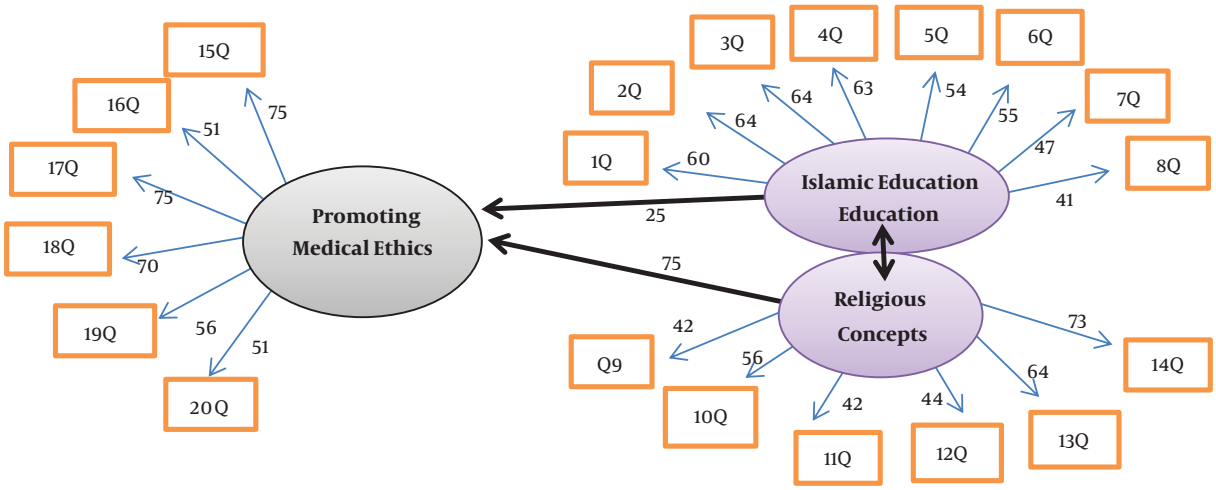

Figure 1. Structural equation model of research hypotheses

Table 1. Results of Testing Hypotheses

Hypothesis	Impact of Variable	Impact on Variable	Regression Coefficient	P Value	Result
1	Courses on Islamic education	Promotion of medical ethics	0.25	0.012	Accepted
2	Religious contents	Promotion of medical ethics	0.75	< 0.001	Accepted

Table 2. Demographic Characteristics of the Study Participants

Variable/Frequency	No. (%)
Gender	
Male	13 (39.5)
Female	225 (60.5)
Age, y	
Less than 20	41 (11.3)
20 - 25	175 (48.7)
25 - 30	120 (33.3)
Above 30	24 (6.7)
Educational level	
Bachelor	41 (18.6)
Master's degree	250 (45.6)
PhD	69 (31.4)

of the model showed that the data supported the models well. After evaluation and verification of the measurement models, the structural equation modeling was used to test the hypotheses. The general fit indices of the conceptual model of the study are shown in Table 4.

In addition to the content-related deep relationship with many medical ethics, courses on Islamic education can promote medical ethics in the targeted society and remain a direct impact on medical ethics education (Hypothesis 1). Also, understanding and conveying religious concepts to students has a significant contribution to increasing their level of productivity in terms of the concepts of medical ethics. As shown in Table 2, the influence of religious concepts on the promotion of the quality of medical ethics is even greater than that of Islamic education teaching; since courses on religious concepts, as students' subjective and ideological presuppositions, help them to better get the contents, while studying medical ethics and can also increase the level of medical ethics (Hypothesis 2).

4. Discussion

The current study aimed at developing a comprehensive framework to promote medical ethics through evaluation of the impact of teaching Islamic education and religious concepts on the promotion of this particular area of professional ethics among medical students. According to the studies conducted on medical ethics, it can be concluded that the standards proposed in medical ethics are highly consistent with the ethical principles in the theoretical foundations of Islam and this leads to the promotion of medical ethics through paying more attention to the education of Islamic education. Some studies (12, 13) stated that the principles of medical ethics are parallel

Table 3. The General Fitting Indices of Measurement Models

Variable	Index					
	Df^2/χ	GFI	AGFI	CFI	NFI	RMSEA
Courses on Islamic education	61.3	0.93	0.95	0.98	0.93	0.066
Religious concepts	3.15	0.91	0.94	0.93	0.90	0.048
Promotion of medical ethics	3.55	0.91	0.94	0.93	0.95	0.48
Acceptable fitness (19)	< 5	> 0.90	> 0.80	< 1, < 0.90	< 1, < 0.90	< 0.08

Abbreviations: AGFI, adjusted goodness of fit index; CFI, comparative fit index; df, degree of freedom; GFI, goodness of fit index; NFI, normed fit index; RMSEA, root mean square error of approximation.

Table 4. General Fitting Indices of Structural Research Model

Variable	Index					
	Df^2/χ	GFI	AGFI	CFI	NFI	RMSEA
Structural model	3/48	0.95	0.94	0.91	0.94	0.055
Acceptable fitness (19)	< 5	> 0.90	> 0.80	< 1, < 0.90	< 1, < 0.90	< 0.08

Abbreviations: AGFI, adjusted goodness of fit index; CFI, comparative fit index; df, degree of freedom; GFI, goodness of fit index; NFI, normed fit index; RMSEA, root mean square error of approximation.

with moral principles in Islam and complementary to each other.

Some studies highlighted moral principles in medical sciences in four general categories consistent with different cultures and schools. The four moral principles include "respect for human discretion, the usefulness of practices, not harming others, and justice" (20). The ethical application of the principles by physicians requires a complete and comprehensive insight that is guidance in all the affairs. After examining the study hypotheses, a direct correlation was observed between the two components of Islamic education and the promotion of medical ethics that was consistent with the findings of Hoseini et al. (12). According to the results of the study by Shomali and Momeni (13) as well as Hoseini et al. (12), a direct relationship was observed between religious concepts and the promotion of medical ethics.

The present study was conducted at a university of medical sciences on the limited statistical population and the responses of this group to a standardized questionnaire on the impact level of courses on Islamic education and effectiveness of religious concepts to promote medical ethics were analyzed. According to the results obtained from the study hypotheses that the constructive role of courses on Islamic education on the promotion of medical ethics is somewhat neglected and has a lesser share than religious concepts in influencing the promotion of medical ethics, and in order to identify the negligence factors, the challenges facing education in this area should be addressed.

Some suggestions were offered in order to make the teaching of Islamic education more effective using a functionalist approach, of which the negligence factors of courses on Islamic education and its reduced impact on the promotion of medical ethics are noted. Such suggestions evaluate the atmosphere of Islamic education teaching in three sections of feasibility, necessity, and facing challenges; each of the sections has subcategories.

4.1. Feasibility

Suggestions in this field include "the feasibility of offering Islamic education courses at higher levels with excellent concepts during the study; teaching with the aim of familiarizing the students with Islamic issues correlated with medicine and the method to convey contents to students, planning and providing educational content with the nature of Islamic ethics, based on the medical education; the employment of experienced professors committed to ethical principles, religious foundations, and interdisciplinary viewpoint; and benefitting from positive experiences in other disciplines such as humanities".

4.2. Requirement

Suggestions for this field include "the necessity of providing meaningful concepts of Islamic education and its correlation with medical ethics during the course of study; familiarity with the religious and moral functionalities in medical practices, parallelizing theoretical and practical teaching of religious concepts and medical ethics while facing the patient in clinical courses, making religious and ethical issues tangible in the behavior of professors during the medical education and in the academic environment".

4.3. Existing Challenges

Suggestions include " lack of experienced professors in the field of medical ethics, lack of familiarity of some Islamic education teachers with the medical areas and medical ethics issues; the relative weakness in the methods of conveying Islamic education to students; excessive tendency toward the translation of Western texts on medical ethics; lack of students' persuasion in solving intellectual and ideological-religious doubts; neglecting the authentic principles of Islam in the education of medical ethics; executive problems in major programs of the educational system; and the impact of cultural gaps on educational planning".

Obviously, if the decision-makers of the educational system in various fields, especially the medical sciences, use the results of such studies on offering Islamic education courses while assessing the needs of students and professors by themselves in order to prepare and compile textbooks, a significant promotion is observed in the quality of Islamic education in the educational system of the Islamic Republic of Iran.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Published online 2018 December 18. **Research Article**

The Perceptions of Patients and Their Families About a Good Physician: A Qualitative Content Analysis

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Abstract

Background: A universal challenge in the development of medical training methods is the description and characteristics of a good physician. It is essential to collect the information of hospitalized patients and their families in order to revise the curricula of medical departments.
Objectives: The present study aimed to explain the viewpoints of patients and their families about the key characteristics of a good physician.
Methods: The present study was carried out using inductive content analysis in 2017. The study sample consisted of patients admitted to different wards of Imam Khomeini Hospital (Tehran, Iran), as well as family members accompanying the patients. Data were collected via purposeful sampling (maximum variation sampling) by conducting semi-structured interviews until reaching data saturation. After the recorded interviews were transcribed, they were reviewed several times and analyzed using Elo and Kyngas coding system.
Results: A total of 19 participants, including 13 patients and six accompanying family members, were recruited in the present study (11 males and 8 females). The analysis of interviews with the participants indicated seven major categories: "Positive personality traits"; "academic and clinical proficiency"; "professionalism"; "effective communication skills"; "fairness and altruism"; "spirituality"; and "continuous professional development".
Conclusions: The definition of a good physician by patients and their families has different implications in educational programs, as future physicians not only can benefit from education about the medical needs of their patients, but also should be familiar with the needs, fears, and concerns of their patients.

Keywords: Patient's Viewpoint, Good Physician, Physician-Patient, Qualitative Content Analysis

1. Background

For many years, medical instructors have discussed and studied the key characteristics of a good physician in order to revise the student selection process and improve the educational curricula of medical schools. In addition, researchers need to understand if physicians meet the expectations of the healthcare system and the community. Such questions need to be addressed in the realms of medical education, medical professionalism, and healthcare system.

Generally, a good physician embodies medical professionalism. Professionalism is described as a controversial multidimensional phenomenon, involving a combination of qualities. This context-dependent phenomenon (1-3) is influenced by cultural and social characteristics and competencies (4). Today, professionalism is regarded as a core component of medical education (5). Every individual equipped with three faculties, including the intellect, will, and imagination, which are naturally balanced and contribute to professionalism. In other words, professionalism provides a new framework for organizing experiences (6).

Overall, it is important to understand the truth about the patient's health condition, to prioritize his/her interests, and to consider his/her condition in the clinical decision (6). Many scholars argue that professionalism education is possible not only through formal educational programs (7), but also through "hidden curriculum" (8). In this regard, Martin in a study entitled, "What is a good doctor? Patient perspectives", reported that patients attribute

three characteristics to a good physician, which include competence, concern (for patient), and communication, he names these three features as "3C" (9).

In another study, Bendapudi et al. evaluated the behaviors of an ideal physician from the patients' perspectives and reported seven ideal behavioral themes (i.e., confident, empathetic, humane, personal, forthright, respectful, and thorough) (10). In addition, Luthy et al. evaluated the patients' perspectives about "good" and "bad" doctors. They used qualitative content analysis to extract eight characteristics for a good doctor, i.e., scientific proficiency, sensitivity to patient emotions, positive personality characteristics, coping with each individual patient, availability, skillful communication, truthfulness, and lack of interest in financial aspects (11).

Moreover, Miratashi Yazdi et al. in a study on the features of a good physician described the patients and physicians' perspectives. This study consisted of two qualitative and quantitative phases. Nineteen themes emerged from the thematic analysis, which were categorized into five major groups: Physician-patient relationship; diagnosis and treatment; ethics; accountability; and appearance and personal characteristics (12).

In addition, Moein and Seyed Mortaz evaluated the characteristics of a good physician from the patients' viewpoint. In their study, the patients attributed the following characteristics to a qualified physician: Good temper and good behavior; high level of medical knowledge; patience; being ethical and responsible; being a good listener; providing patients with useful and adequate information about the disease; humanity; overlooking financial issues; spirituality; and understanding and empathizing with patients (13).

Recently, patients' perceptions of the characteristics of a good physician have attracted the researchers' attention, and various structured questionnaires have been developed for this purpose (14). However, there is limited knowledge about the viewpoints of hospitalized patients and their accompanying family members about the concept of a good physician.

2. Objectives

The present study aimed to explain the viewpoints of patients and their families about the key characteristics of a good physician.

3. Methods

In this qualitative study, the content analysis method, proposed by Elo and Kyngas, was applied, which comprises of three main stages: Preparation, organization, and reporting (Figure 1). Generally, qualitative content analysis is a systematic and purposeful approach for describing a phenomenon (15). In a qualitative content analysis, raw data are interpreted and summarized, and subclasses and themes are extracted (16).

The study sample consisted of patients admitted to different wards of Imam Khomeini Hospital (Tehran, Iran), as well as their accompanying family members. Patients, who were hospitalized for more than one week and accompanied by family members, were recruited in the study. On the other hand, patients who were admitted to the emergency unit, intensive care unit (ICU), or coronary care unit (CCU), or hospitalized for less than one week were excluded.

Data were collected using purposive sampling. Sampling to achieve representativeness or comparability is described as a purposive sampling method. This method is used by researchers, who aim to find a suitable representative sample for a larger group of samples or seek comparison between different groups of items (17). It is classified into six major types, including typical case sampling, extreme or deviant case sampling, intensity sampling, maximum variation sampling, homogeneous sampling, and reputational case sampling (18).

In the present study, maximum variation method was selected considering the diversity of samples, including male and female patients, patients from different wards, age groups, and cultures, in addition to their accompanying family members. The purpose of this method is to ensure that all variables related to the subject are examined and to represent the main themes extracted from the participants (19). Sampling continued until data saturation.

Data were collected using semi-structured interviews. The main question of the interview was: "In your opinion, what are the characteristics of a good doctor?" the time of each interview was 15 to 20 minutes on average, depending on the participant's condition. The interviews were conducted by two people (male and female) with Master's degree in sociology and PhD in medical education, respectively. Considering the ethical considerations, the study objectives were explained to the participants, and the participants' permission was obtained to record the interviews. In addition, information confidentiality and anonymity were respected, and the participants were allowed to withdraw from the study at any time.

After making arrangements and requesting appointments, interviews were conducted with patients in a setting where they felt most comfortable (a quiet room or hospital environment) in the presence of one of the patient's family members. The interviews were recorded on an MP3 device. All the recorded interviews were transcribed

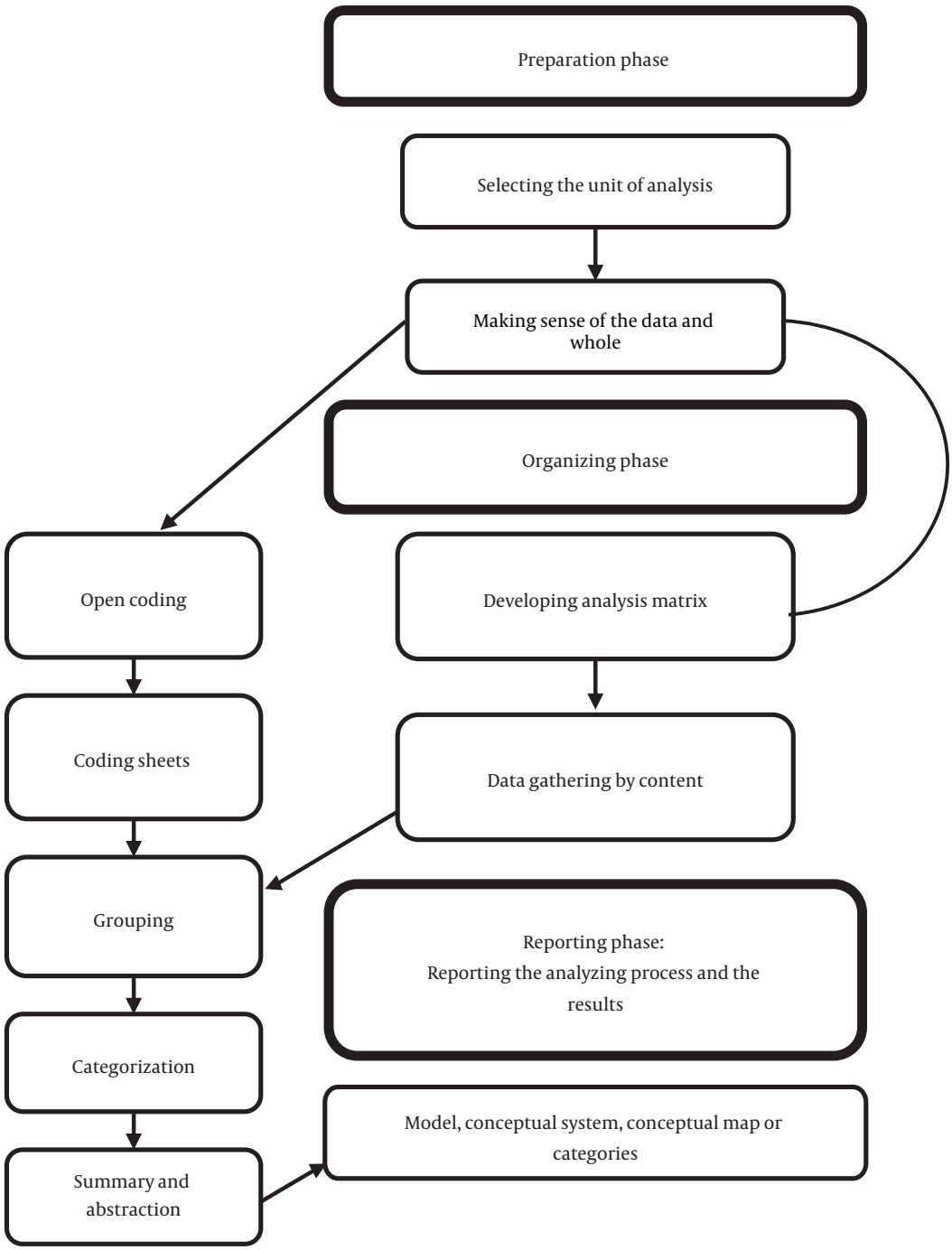

Figure 1. Processes of preparation, organization, and reporting in the inductive content analysis approach (15)

word-by-word by the researcher after each session. Two experts were responsible for the extraction and categorization of data, while one examiner analyzed the data. In the next step, semantic units were extracted and coded. The units were classified in categories based on their similarities (subcategories), and then, the main categories were formed by combining these subcategories (Table 1).

One of the personality traits of a good physician de-

Table 1. Subcategories and Main Categories Extracted from the Participants' Description of a Good Physician

Main Themes	Subthemes
Positive personality traits	1. A good doctor is good-tempered and well-behaved
	2. A good doctor is smiling
	3. A good doctor acts like a friend (intimacy and kindness)
Academic and clinical proficiency	1. A good doctor has professional and scientific proficiency
	2. A good doctor is clinically competent
	3. A good doctor makes accurate diagnoses
	4. A good doctor presents a scientifically detailed explanation of the disease for the patient or accompanying family
Professionalism	1. A good doctor is flexible in meeting the needs of each patient and devotes adequate time to each patient
	2. A good doctor is reliable
	3. A good doctor tells the truth
	4. A good doctor does not care about the financial aspects and understands the financial problems of patients and their families
Effective communication skills	1. A good doctor establishes a respectful relationship with the patient and his/her accompanying family members
	2. A good doctor is empathetic and sympathetic to the patient and his/her family
Fairness and altruism	1. A good doctor does not discriminate patients
	2. A good doctor follows-up chronic patients after discharge via phone calls or other communication methods.
Spirituality	1. A good doctor gives hope to patients and their families.
	2. A good doctor has a God-centered and spiritualistic approach in patient interactions.
	3. A good doctor has Patience & forbearance.
Continuous professional development	1. A good doctor is aware of the latest medical treatments (being up-to-date).

scribed by the participants was being smiling. In this context, patient No. 9 said:

"I have never seen my doctor come to my room in a bad or angry mood! This makes me feel relaxed."

The participants believed that professional and scientific proficiency is another characteristic of a good physician. In this regard, patient No. 2 stated:

"A good doctor is the one who knows about the patient's illness and can recognize the problems based on the patient's signs and symptoms!"

The participants also believed that a good doctor adapts to the needs of patients. In this context, patient No. 12 stated:

"I am 71 years old, I have hearing difficulties, but my doctor is very considerate of me. When he talks to me or examines me, he speaks loudly and stands close to me; this is very pleasant for me."

Attention to the financial problems of patients and their families was another characteristic of a good physician. In this regard, one of the companions of patient No. 2 said:

"One of my good experiences is when my brother told his doctor that he had financial problems, and the doctor helped him by giving me the money without letting him know. I am really grateful to him, because we were short of money and needed help for my brother."

Empathy and sympathy with the patient and his/her family are among other qualities of a good physician. One of the patients' companions (No. 1) stated:

"About a year ago, my brother was in a car accident on Khavaran Road and was in a very bad position; I took him to the hospital in a helicopter, and he was admitted to the intensive care unit. The doctor asked me to stay in the room and accompanied the patient during resuscitation. His behavior lifted my spirit; he was a really good doctor, because he understood my situation."

Another characteristic of a good physician is having a comprehensive and all-inclusive view of the patient's situation rather than only focusing on the disease. In this context, patient No. 13 stated:

"A good doctor defies ethnic or cultural discrimination towards patients and considers all patients to be equal."

According to the participants, good physicians can bring hope and peace to patients and their families. Patient No. 11 said:

"When I asked my doctor about my disease, he gave me a detailed explanation. I was really worried about my condition and had no hope in treatment! But he kindly told

me not to worry about it and trust in God and then him! I felt very hopeful after hearing that."

Another feature that patients described for a good physician was knowledge of advanced therapies. In this context, patient No. 6 said:

"I think a bad doctor is the one who uses therapeutic methods and procedures, which were considered standard five, six, or even seven years ago. Now, you can guess what it means to be a good doctor! In other words, a good doctor is familiar with the most recent advances in the world of medicine."

The results of data analysis indicated that the descriptions of patients and their families about a good physician were similar in five categories, including "academic and clinical proficiency", "professionalism", "effective communication skills", "fairness and altruism", and "spirituality". On the other hand, their definition of a good physician differed in two categories of "positive personality traits" and "continuous professional development" (Figure 2). In general, data analysis of interviews with patients and their families about the characteristics of a good physician can be presented as in Figure 2.

4. Results and Discussion

In this qualitative study, the viewpoints of patients and their families about the characteristics of a good physician were investigated. Based on the analysis of interviews, seven characteristics, including academic and clinical proficiency, professionalism, effective communication skills, fairness and altruism, spirituality, and continuous professional development, were extracted.

As presented in Figure 2, definitions of patients and their families of a good physician overlap, and only two categories of positive personality traits and continuous professional development were different. In other words, the patients' families in their definition of a good physician did not describe two categories of positive personality traits and continuous professional development. This difference can be attributed to diversities in the viewpoints of patients and their families about a good physician, as well as the quality of physician-patient relationship.

From the patients' point of view (not families), positive personality traits are one of the key characteristics of a good physician. This finding is consistent with the results reported by Luthy et al. (11). In their study, they found that positive personality traits (such as friendliness, kindness, and amiability) are among the key characteristics of a good physician (11). The present findings are partly consistent with the results reported by Miratashi Yazdi and colleagues, as patients in their study highlighted the appearance and personality characteristics of a good physician (12). On the other hand, the findings of our study are inconsistent with the study by Miratashi Yazdi et al. as physicians described appearance and personality traits as the least important traits of a good doctor (12).

With regard to the category of positive personality traits, the findings of the present study are consistent with a quantitative study by Moein and Seyed Mortaz, which defined friendliness and good temperedness as the key features of a good physician (13). Also, the findings of our study are in agreement with the results reported by Bendapudi et al., who noted kindness and compassion as the key attributes of a good physician (10).

From the viewpoint of patients and their families, another key characteristic of a good physician is academic and clinical proficiency. The findings of the present study are similar to the results reported in the quantitative study by Moein and Seyed Mortaz, as they also described scientific level, experience, and skillfulness of a good physician (13). In this regard, Luthy et al. concluded that academic skill is a positive feature of a good physician (11), which is in line with our findings. In addition, our findings are consistent with the results reported by Cuesta-Briand et al. as they attributed knowledge-based clinical competence to a good physician (20).

In addition, our findings are consistent with the results of a study by Martin, which introduced competence as a key characteristic of a good physician (9). Moreover, Bendapudi et al. reported similar results to our study, as they suggested clear disease-related explanations to patients as an ideal medical practice (10). On the other hand, some of our findings are contradictory with some results reported by Bendapudi et al. as they discarded scientific and clinical competence as the key characteristics of a good physician (10).

From the participants' points of view, another key characteristic of a good physician is professionalism. In this regard, the findings of our study are partly contradictory with a study by Cuesta-Briand et al. as they separated two categories of "good physicians" and "professional physicians", although they were somewhat overlapping (20). Concerning the issue of professionalism, the findings of the present study are consistent with the results reported by Luthy et al. as they described characteristics, such as coping with each patient, sincerity, and disregard for financial aspects. Nevertheless, Luthy et al. did not consider confidentiality (11).

The present results are in line with the findings reported by Miratashi Yazdi et al., highlighting the importance of good behavior and good temper in physicians (12). In addition, Moein and Seyed Mortaz reported consistent results with our study in terms of the importance of being diligent, responsible, and less money-oriented (13). On

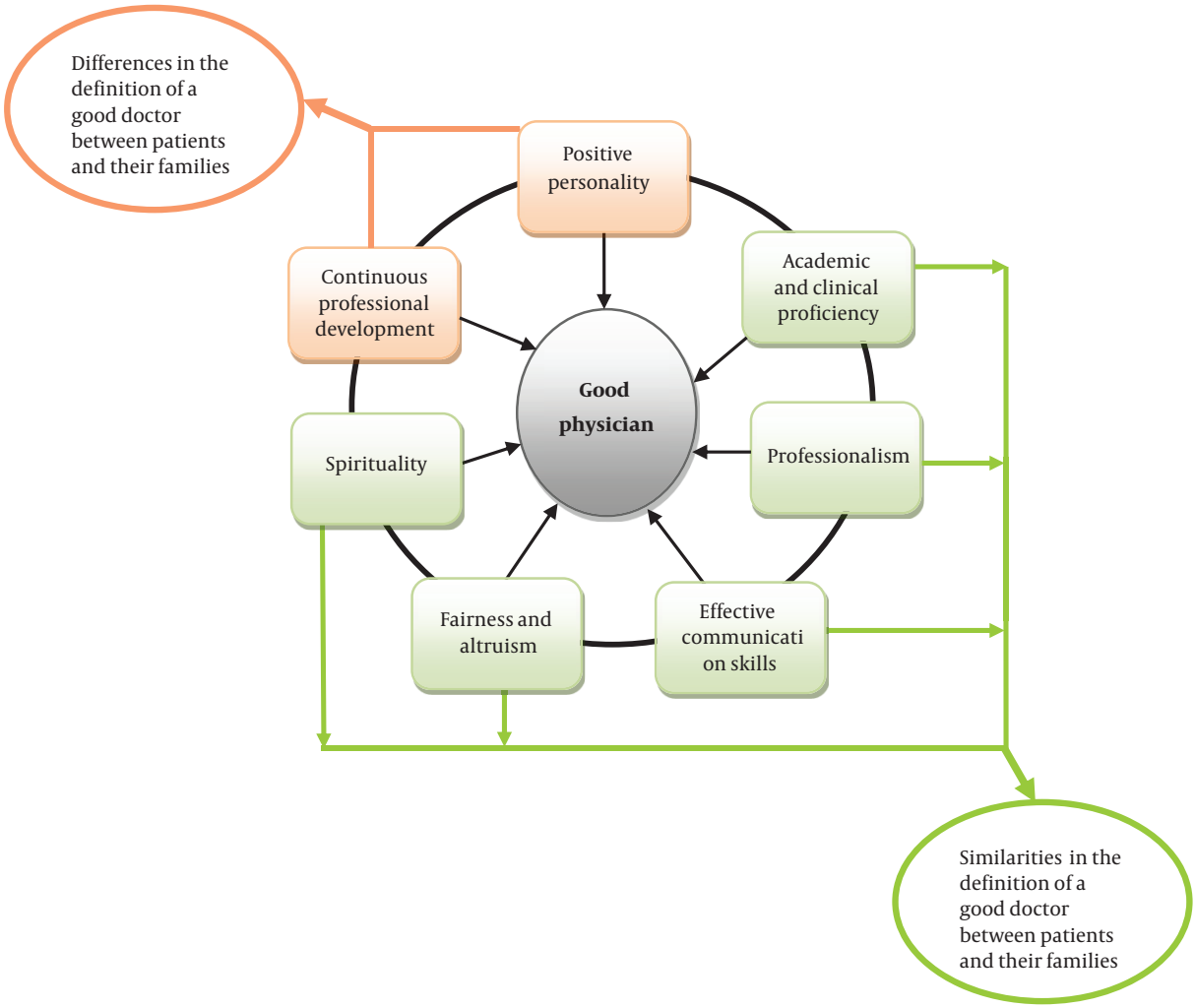

Figure 2. The characteristics of a good physician from the perspective of patients and their families

the other hand, the present study is inconsistent with the study by Moein and Seyed Mortaz, as they failed to consider truthfulness and secrecy (13). The findings of the present study are also consistent with the results reported by Martin. as they considered the physician's concerns about the patient as one of the important features of a good physician (9).

Another key feature described by the participants about a good physician was effective communication skills. From this perspective, the results of study by Lambe and Bristow showed that a sociable attitude (empathic and non-judgmental) is a good physician's characteristic (21). Also, the findings of the present study are consistent with studies by Martin (9), Luthy et al. (11), Miratashi Yazdi et al. (12), Moein and Seyed Mortaz (13), and Cuesta-Briand et al. (20). In all these studies, communication skills, skillful communication, physician-patient relationship, empathy, and good communication are among the characteristics of a good physician.

A study by Bendapudi et al. indicated empathy, politeness, and respect as ideal behaviors of a doctor (10), which is in line with the findings of the present study. Another key feature described by the participants was fairness and altruism. The findings of the present study are almost in line with the results reported by Bendapudi et al. as they considered attention to patient as a human being as an ideal medical behavior (10). In general, ethnic, linguistic, and cultural impartiality has not been described in any of the previous studies; therefore, this could introduce a new insight into the concept of a good physician and medical

education.

From the point of view of the participants, spirituality is another important characteristic of a good physician. These findings are consistent with the results of the research by Moein and Seyed Mortaz, which indicated faithfulness and patience as important qualities of a good physician (13). The results of the present study are in contrast with the results of studies by Luthy et al. (11), Miratashi Yazdi et al. (12), Cuesta-Briand et al. (20), and Lambe and Bristow (21), as none of these studies considered patience or faithfulness in their description of a good doctor.

Finally, the last feature, which was only described by patients for a good physician, was continuous professional development. The findings of the present study are in agreement with the results of the study by Cuesta-Briand et al. which distinguished between the components of good physician and professional physician. In their study, they found that life-long learning is one of the key characteristics of a good physician (20). In this regard, the present results are consistent with the findings of the study by Luthy et al. with the exception that they classified being up-to-date through continuous medical education in the category of academic competence (11). However, our findings are inconsistent with the results reported by Martin (9), Bendapudi et al. (10), Miratashi Yazdi et al. (12), and Moein and Seyed Mortaz (13), as they did not consider continuous professional development as a key characteristic of a good physician.

4.1. Conclusion

This study discussed the viewpoints of patients and their accompanying family members about the key characteristics of a good physician. A major concern in the healthcare system is evaluation of the priorities of patients and their families. In addition, description of a good physician by patients and their families should be taken into account in educational programs, since future doctors not only should be familiar with new medical phenomena, but also should be trained to discover the needs, fears, and concerns of patients. Based on the present findings, it is important that the Ministry of Health and National Organization of Educational Testing Recruit Medical Students based on their personality traits. In addition, we can apply outcome-based education to promote characteristics, such as scientific and clinical proficiency, professionalism, and continuous professional development. On the other hand, the hidden curriculum can be highlighted for professionalism. Finally, to promote characteristics, such as effective communication skills, fairness and altruism, and spirituality, training workshops can be integrated in medical education, besides formal education, with an emphasis on behavioral and human sciences.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: Soleiman Ahmady, was responsible for the design of the study, interpretation of the data and critical revision of the manuscript. Hamed Khani, contributed to the collection of data, analysis and interpretation of the data and drafting of manuscript. Zohrehsadat Mirmoghtadaie, contributed to the analysis of data and critical revision of the manuscript. Finally, all authors read and approved the final manuscript.

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Design, Implementation, and Evaluation of a Medical Education Fellowship Program for the Faculty Members of Kerman University of Medical Sciences Based on the Kirkpatrick Model

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Abstract

Background: Attempts to increase the development of faculty members can improve their ability to assume different roles.
Objectives: The purpose of this study was to design, implementation, and evaluation a medical education fellowship program for the faculty members of Kerman University of Medical Sciences and to propose practical recommendations for the future design of development programs.
Methods: In this semi-experimental study, a total of 53 faculty members of Kerman University of Medical Sciences participated in a one-year development program, which was designed by the Education Development Center and included the main disciplines of medical education. The program was evaluated in several steps, using the Kirkpatrick model.
Results: In the first level of Kirkpatrick model, the majority of the participants were satisfied with the general quality of the fellowship program. Based on the findings, the program led to an increase in the knowledge of faculty members and promoted a more positive attitude towards education and these programs. The findings related to the second level of Kirkpatrick model showed a significant difference between the pretest and posttest results ($P < 0.05$). In addition, analysis of the effects of the program on the participants' behaviors and practical learning indicated positive changes.
Conclusions: The medical education fellowship program led to positive changes in the participants' attitudes towards education and faculty development programs and increased their knowledge about educational principles and strategies and achieving of training skills. It can be concluded that the medical education fellowship program could achieve many of its preset goals.

Keywords: Faculty Development Programs, Medical Education, Faculty Members

1. Background

The main purpose of medical education institutions is to provide human resources education and training and to facilitate health development in the country. Experienced and motivated faculty members are the most important elements in achieving this important goal (1). Efforts to promote the progress of these key figures in any educational institution can lead to an increase in the quality of learning, improve the learners' capabilities, and increase the quality of health services (2). Therefore, the role of faculty members as leaders of students' progress is very important (3).

Changes in healthcare organizations, increased complexity of healthcare services, and changing concepts of medical education, such as new teaching, assessment, and learning methods, have led to increasing demands for faculty members to fulfill different educational, research, leadership, and managerial roles (4, 5). Efforts and activities for the development of faculty members will strengthen their ability to assume different educational, managerial, and cultural roles and become role models in the field of health.

Many medical universities around the world have designed and implemented different programs to enhance

the skills of faculty members (6, 7). The purpose of development programs for faculty members is to incorporate suitable activities in order to prepare and assist them in assuming different roles in education, research, leadership, and management. By using these programs, the individual's productivity, efficiency, personal growth, and professional development are promoted for meeting organizational goals (4, 7-11).

In other words, faculty development programs are described as a process, which prepares the individual for different roles and helps them to be more productive and informed (12). Annually, medical universities spend significant amounts of money and time on the development of faculty members. Therefore, it is necessary to conduct an accurate and scientific evaluation to determine the strengths, weaknesses, and improvement strategies of these programs and to describe their overall effectiveness (13).

Various training courses, including the medical education fellowship program, have been used for the development of faculty members by the Education Development Center of Kerman University of Medical Sciences. This program was established in September 2014 with the aim of improving the faculty members' knowledge about medical education and familiarizing them with new methods of curriculum and educational planning, teaching, and assessment. During two runs of the medical education fellowship program from 2014 to 2016, a total of 100 faculty members were participated.

2. Objectives

The purpose of the present study was to design, implementation, and evaluation a medical education fellowship program for the faculty members of Kerman University of Medical Sciences and to present practical recommendations for the design of future development programs.

3. Methods

In this semi-experimental interventional study, the educational development program for faculty members, developed by Education Development Center of Kerman University of Medical Sciences, was designed, implemented, and then evaluated. The development program continued for one year from September 2015 to September 2016. In this program, fifty-three faculty members of Kerman University of Medical Sciences were randomly selected among volunteers.

The educational content of the program included four modules as the main areas of education: Curriculum and educational planning, teaching methods, student assessment, and new technologies in e-learning. The duration of each module was two and a half months. The module of curriculum and educational planning was completed in four workshop sessions, each session was five hours (total, 20 hours), the module of teaching methods was completed in seven workshop sessions, each session was five hours (total, 35 hours). The module of student assessment was presented in four workshop sessions, each session was five hours (total, 20 hours), while the module of new technologies for e-learning was completed in three workshop sessions, each session was five hours (total, 15 hours).

The objectives of the module of curriculum and educational planning were as follows: Familiarity with curriculum and educational planning, acquisition of necessary skills for curriculum development, increasing the participants' knowledge about the theoretical and practical frameworks of educational planning, and increasing their awareness about the current challenging issues of curriculum and educational planning. On the other hand, the purpose of the module of teaching methods was to help faculty members achieving skills and gain knowledge about modern teaching methods.

In the module of student assessment, considering the importance of learner assessment in the training cycle, develop a proper understanding of the importance and role of student assessment in learning, familiarize the participants with the concepts of educational assessment and different stages of exam planning, and promote their ability to design standard exams and evaluate the assessment system of medical students.

Finally, the goals of the module of new technologies for e-learning were familiarity with virtual education and the related programs.

The educational content of the sessions was selected by a panel of experts, based on reliable medical education resources and the literature on similar programs in other medical universities around the world. In our one-year fellowship program, a combination of student-centered and teacher-centered methods was applied. Therefore, a large part of the training was based on problem based learning, team work, projects, question and answer, discussions in small groups, e-learning, and virtual education.

The developed program was evaluated based on the Kirkpatrick model. In this model, there are four questions about the training program, which are addressed in each stage of evaluation (14):

Reaction: Did the learners show positive response to the program?

Learning: Did the program increase the knowledge of learners in a satisfactory way?

Behavior: Did the program cause positive changes in

the behavior of learners?

Results: Did the program cause positive changes in organizational indicators?

The first level of Kirkpatrick model is reaction, which represents the learner's interest in the course, desirability of the course, and level of satisfaction with the course. In terms of reaction to our fellowship program, the content, instructor, and facilities were evaluated using a 15-items questionnaire, which was presented to the participants at the end of the program. At the end of each questionnaire, the participants were asked to give their comments. The questionnaire was rated on a Likert scale, ranging from very weak (1 point) to very strong (5 points).

The second level of Kirkpatrick model is learning, which aims at defining and comparing the knowledge and skill of faculty members in the pretest (before the start of each module) and posttest (immediately after the end of each module). For this purpose, a four-option test, based on the program objectives and content, was designed, consisting of 20 questions. To validate this test, its content validity was confirmed by the panel of experts. In addition, its internal consistency was evaluated by calculating the Cronbach's alpha coefficient (0.85).

In the third level of Kirkpatrick model, behavioral changes of the faculty members, participating in the medical education fellowship program, were examined. For this purpose, the scores of faculty members, given by their students before and after participation in the faculty development program, were compared. Finally, the fourth level of Kirkpatrick model is the results, which was not taken into consideration in our study due to the need for a time gap between program implementation and fourth-level evaluation.

The collected data are presented as mean and standard deviation. For data analysis, mean-comparison tests (*t*-test) were performed in SPSS version 23 (IBM Corporation, Armonk, NY, USA). $P < 0.05$ was considered statistically significant. During all stages of the study, ethical principles, including confidentiality of information, were considered, and informed consents were collected from the participants for completing the questionnaires.

4. Results

In this study, the medical education fellowship program was implemented at Kerman University of Medical Sciences, from September 2015 to September 2016, and a total of 53 faculty members were participated. Overall, 41% of the participants were clinical sciences, 25% were health and management, 12% were dentistry, 10% were basic sciences, 7% were pharmacy, and 5% were nursing and midwifery. Based on the findings, 64% of the participants had less than five years of work experience, while 36% had more than five years of experience. In terms of academic rank, 3% of the participants were instructors, 88% were assistant professors, and 9% were associate professors.

In the first level of Kirkpatrick model, most participants (87%) believed that the overall quality of the medical education fellowship program was satisfactory, while 12% described moderate satisfaction. Some participants found the program to be useful, interesting, and relevant to their goals; they also claimed that they became more aware of their strengths and weaknesses in education. In addition, reported higher self-confidence, motivation, and interest in teaching and stated that they would recommend the program to other colleagues.

Evaluation of the second level of Kirkpatrick model showed a significant increase in the participants' knowledge from the pretest (mean score, 9.9 out of 20) to posttest (mean score, 13.9 out of 20), based on the results of *t*-test; this finding confirms the positive effects of the program on medical education.

In the third level of Kirkpatrick model, for assessing behavioral changes and application of acquired knowledge, the assessment scores of faculty members, given by 180 students, were compared before and after participation in the faculty development program. In the first semester, the mean assessment score of faculty members was 4.38 prior to participation in the program, while it increased to 4.5 in the semester incorporating the program. Moreover, the mean assessment score of faculty members was 4.8 in the first semester after the end of the program, which is indicative of positive changes.

5. Discussion

The purpose of this study was to design, implementation, and evaluation a medical education fellowship program for the faculty members of Kerman University of Medical Sciences and to present practical recommendations for the future design of faculty development programs. The results showed that this program led to positive changes in the participants' attitude towards education, promoted the application of development programs for faculty members, and increased their knowledge about educational principles and strategies and acquisition of educational skills. Based on the results, the medical education fellowship program could achieve many of its preset goals.

Steinert et al., in a systematic review of articles published during 2002 - 2012 on the development of faculty members, concluded that the success of development programs is dependent on the accurate and scientific design of programs based on the needs of faculty members, with

attention to the principles of adult education, interactive and collaborative methods of education, opportunities for gaining experience, and incorporation of long-term programs (5).

As mentioned earlier, design of development programs for faculty members should be targeted and in line with learning principles; additionally, participation of faculty members in the program should be facilitated (15). Therefore, in the design of our medical education fellowship program, we tried to develop the content and curriculum, based on the educational needs of faculty members and the main disciplines of medical education.

Generally, in the implementation of development programs for faculty members, it is necessary to use a variety of teaching methods in a flexible manner, depending on the conditions of the learner (16). In this study, for implementing the program, we attempted to use interventions according to the principles of adult education and learning, empirical learning, inclusive education, and feedback. In this regard, a study by Elliot et al., which aimed at examining the effectiveness of an 18-month faculty development program in medical education for faculty members, showed that the program could increase job satisfaction, motivation, self-confidence, and knowledge of faculty members about teaching and educational methods. Also, they concluded that faculty development programs need to be long-term in order to be successful (17).

Moreover, the results of a study by Knight et al. on the effects of a long-term development program for faculty members at Johns Hopkins University showed an improvement in the feedback skills of the intervention group and indicated their greater interest in student-centered teaching methods, compared to the control group (18). Similarly, in the present study, implementation of our one-year medical education program resulted in more stable results.

A review of the literature, including a review study by McLeod et al. (10), a systematic review by Steinert et al. (4), a research study by Sorinola and Thistlethwaite (8), a systematic review by Leslie et al. (1), and a review study by Steinert et al. (5), indicates significant positive changes in faculty-development programs over the past years. However, despite the progress in the number and quality of these programs, limited efforts have been made to evaluate their effects. Accordingly, in the present study, we aimed to evaluate the effects of a medical education program, using the first three levels of Kirkpatrick model.

The results of the present study are in line with the findings of some previous research (19-21), in which development programs for faculty members led to their progress. Nevertheless, there are limited studies evaluated the effectiveness of these programs in Iran, despite the establishment of numerous faculty development programs in our country. Similarly, no research has been carried out to investigate the effects of these programs in Kerman University of Medical Sciences. Therefore, in this study, the effects of a similar program were evaluated for the first time in this university.

Previous studies have reported consistent results to the present study. These studies indicated the participants' satisfaction with faculty development programs, positive changes in their knowledge and attitude, and self-reported behavioral changes after participation in the program. In this regard, Kollisch et al. evaluated the effects of a development program about teaching methods for faculty members and reviewed the viewpoints of the participants, their assistants, and program organizers before and after the program. The results indicated that the faculty members had become more considerate of the educational needs of their assistants. They also showed increased flexibility, feedback, interest, and motivation for teaching after participation in the program (22). Moreover, Gelula and Yudkowsky concluded that participation in development programs would increase the knowledge of faculty members about teaching methods and strategies and improve their understanding of feedback compared to the pretest (23).

Studies by Berbano et al. (24), Hewson et al. (15), and Tax et al. (25) have suggested improvements in the faculty members' ability to establish an appropriate learning environment after participation in the faculty development programs. In addition, they could ask more suitable questions, communicate effectively with the students, patients, and their families, and manage their time more efficiently. In addition, the teaching skills of the participants improved after the program, and positive changes were made in their attitudes towards faculty development and educational programs. Also, Behar-Horenstein et al. concluded that participation in such programs would result in the practical use of acquired skills, such as asking proper questions, student engagement in the classroom, and use of relevant examples for improving the understanding of materials (26).

Based on the results of this study, in the design of faculty development programs, it is suggested to implement long-term development courses based on relevant theoretical frameworks, on-the-job training principles, peer learning, and organizational support for these programs. In the evaluation of faculty development programs, it is also suggested to incorporate combined evaluation methods to review the changes after programs at organizational levels and to assess the extent to which the presented materials are practically used in the workplace.

There are several limitations in this study. First, the effects of the program were only examined in a small group

of participants at a single university; this in fact limits the generalizability of our findings. Second, no control group was included in this study to accurately investigate the effects of the program; therefore, it was difficult to determine the exact effects and relate them to the medical education program. Finally, to investigate the results and outcomes of the program, three levels of Kirkpatrick model were considered in our study, while the fourth level was not taken into consideration due to the need for a time gap between the implementation of the program and the fourth level.

In future research, it is suggested to recruit a larger sample size from different universities. In addition, for a exact evaluation of the effects of faculty development programs, it is recommended to include a control group and perform comparative analyses.

5.1. Conclusions

Annually, many faculty development programs are established by medical universities for the development of faculty members; however, implementation of these programs is costly and time-consuming. Generally, the most positive outcomes of these programs include their efficacy in the education and training of learners and the consequent increase in the quality of provided services.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: There is no conflict of interest.

Ethical Considerations: During all stages of the study, ethical principles, including confidentiality of information, were considered and informed consents were collected from the participants for completing the questionnaires.

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Improvement of the Quality of Basic Clinical Skills Training and Evaluation of the Efficacy of Objective Structured Clinical Examination (OSCE): An Action Research with a Mixed Method

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Abstract

Background: One of the main goals of action research is to improve the quality of education at both individual and organizational levels. Management enables organizations to improve their performance in areas, which have the greatest impact on students' learning and empowerment, without compromising the quality of education.
Objectives: In this study, we aimed to improve the quality of basic clinical skills training for nursing students in an action research, using the available resources.
Methods: In this action research, a sequential mixed method was applied. The participants in the qualitative phase included experts in the field of education, students, and stakeholders responsible for training at the nursing skills, midwifery, and medical-surgical nursing units of Razi Faculty of Nursing and Midwifery in Kerman, Iran. Assessment of facilities and resources in the quantitative phase was also carried out using a data collection form, a student survey form, and a checklist of basic clinical skills. The stages of action research included action planning for problem-solving, implementation, evaluation, and reflection. The students' problems with the basic clinical skills and their possible causes were also identified. The most effective and practical solutions for quality improvement included improvement of the educational environment of skill laboratories, followed by the enhancement of skills assessment process using an objective structured clinical examination (OSCE).
Results: The conventional method failed in the assessment of students' competence and lacked adequate objectivity and reliability. A significant difference was observed in the mean scores of basic clinical skills (e.g., injection, measurement of vital signs, and dressing) between the conventional method and OSCE ($P < 0.05$). From the viewpoint of students, OSCE is more reliable and accurate than the conventional method and uses more suitable educational materials and facilities.
Conclusions: Based on the findings, by improving the educational environment of clinical skills laboratories and implementation of OSCE, nursing students can translate their knowledge of basic clinical skills into practice. We can also improve the quality of health services and clinical care for patients and reduce the incidence of practical errors made by nursing students.

Keywords: Education, Clinical Skills, Nursing, Midwifery, Students, Action Research

1. Background

One of the important parts of educational development in a country is improvement of education quality through modifying and balancing educational goals with educational performance and activities. According to the literature, theoretical and practical aspects of an efficient educational system should be reviewed and revised unceasingly in order to meet the current and future needs of the community (1-3).

The "principles and techniques" course is a basic course related to the clinical activities of nursing and midwifery students. Identification of the current and desired status of theoretical, practical, and clinical training is of great importance in this course (4). The clinical experience acquired during this course by nursing and midwifery students is in fact their first experience and earliest clinical exposure in the first year of education (5).

The students' preparation for safe clinical activities, without making any errors or experiencing anxiety, is important in clinical skills training and student learning. Learning through practice in a simulated environment be-

fore exposure to the actual workplace can facilitate the students' acquisition of clinical skills. However, the quality and quantity of health services provided by nursing and midwifery students indicate that these students have failed to meet the educational goals.

The low quality of health services may be partly attributed to deficiencies in the curriculum and teaching methods applied by instructors (6, 7). As mentioned earlier, the educational content presented in the "principles and techniques" course is the first exposure of students to professional and clinical environments and has great impacts on their academic achievement and clinical practice. The quality of this course depends on accurate and efficient planning, engagement of proficient instructors, and effective assessment (8).

In order to improve the process of educational decision-making and practice, students' cooperation and participation, along with an understanding of experts' experiences, are essential. Moreover, knowledge of the viewpoints of students (as recipients of education)about educational activities is valuable for instructors (as leaders of the educational process), especially when changes are introduced in the educational process (2, 3, 9).

Modification of the management structure and increasing productivity are among factors, which not only improve the quality of health services, but also lead to the achievement of competitive advantages. Clinical education is known to play an important role in nursing education and is recognized as a key factor in shaping the professional identity of nursing students (10, 11). Also, application of theoretical concepts in practice is the main reason for acquiring professional and clinical skills (8).

According to studies by Baxter (12) and Corlett (13), application of a management plan and an action research model is necessary for eliminating the gap between theoretical knowledge and its application in actual work environments. This approach is also considered suitable for revising problem-solving strategies in the development of educational methods, introducing new educational methods and combining them with the conventional ones, and finally improving methods of clinical assessment (14). Identification and management of interrelated processes in the educational system, application of the acquired knowledge in the clinical environment, and optimization of educational planning can also improve the efficiency of educational organizations in achieving their goals (15-17).

Action research is a multi-purpose approach for collecting data from a target group. It is a process through which problems and revisions are described and identified. One of its main goals is to improve education at both individual and organizational levels. Generally, the most important phases in the implementation of action research include "problem appraisal", "action planning", "implementation", "evaluation", and "reflection" (14).

Systemic management, which is used to integrate and classify different processes, is considered the best strategy for achieving the preset organizational goals. This approach also enables the organization to focus on the key processes and fosters a sense of trust, adjustment, efficiency, and growth among stakeholders (18-20). On the other hand, action research is an appropriate solution for problems such as educational problems, leading to the development of novel and creative solutions and improvement of unfavorable conditions. In this approach, theoretical solutions are replaced by practical solutions (4).

Action research is a type of systematic study and a focused attempt for improving the quality of organizational performance. The researcher and the involved team conduct action research, and the researcher is an active participant in the process of change. The main stages of action research include action planning for problem-solving, implementation, evaluation, and reflection (21). The participants concentrate on problem appraisal and providing effective solutions to improve performance with the participation of all people involved in the process (22).

2. Objectives

With this background in mind, the aim of this study was to improve the quality of basic clinical skills training for students, using action research based on the available resources.

3. Methods

This action research was performed using a sequential mixed method. Mixed method research, due to the use of both quantitative and qualitative methods, can present acceptable and reproducible results (1). One of the unique characteristics of action research is the interaction between researchers, stakeholders, and research samples, which is accomplished through review and revision, along with accurate observation and continuous outcome assessment (17).

In this study, experiences of nine faculty members (seven women and two men) from midwifery, nursing skills, and medical-surgical nursing units were evaluated regarding basic clinical skills training through focus group discussion and individual interviews by asking questions, such as "How do you evaluate the status of nursing skills training and assessment? and "What are your experiences of theoretical and practical training?" The interviews continued for 45 to 60 minutes. All interviews were

transcribed, re-read, and analyzed. MAXQDA version 10 was used for the management and analysis of qualitative data, and semantic units, categories, and main themes were extracted through text analysis.

In the quantitative phase, a total of 80 students (27 midwifery and 53 nursing students), who were enrolled in the "techniques and principles" program, were recruited, using purposive sampling method. The students' skills were assessed using the conventional test (random selection of a card related to a skill), followed by objective structured clinical examination (OSCE).

The students' mean score of skill assessment was calculated using a check list. The efficacy of OSCE was measured using a questionnaire, which consisted of 20 questions and was rated on a Likert scale, ranging from completely disagree (score 1) to completely agree (score 5) (score range, 20 - 100).Finally, five open questions were presented to the participants about the tests, and the drafts were collected. Ethical concerns, including anonymity of the questionnaires, disclosure of research objectives, and confidentiality of data, were considered during the study.

Data were analyzed using descriptive (mean and standard deviation) and inferential (independent *t*-test and Pearson's correlation coefficient test) statisticsin SPSS version 19 (SPSS Inc., Chicago, IL).

The required revisions and corrective measures, with a descending order of priority, were as follows: Promotion of practical training through mastery of practical skills; development of basic practical skills of nursing and midwifery students by modifying the educational setting of skill laboratories and use of hospital-based simulations; availability of all required equipment and facilities for nursing and midwifery skills training; and improvement of the process of practical skills assessment by conducting OSCE in the clinical skill laboratory. The students were evaluated using both conventional and OSCE tests.

In OSCE, the examination stations were designed to focus on a sample of clinical competencies, which were randomly selected from the training materials. All students were exposed to similar simulation conditions and examination stations. The assessment checklist was designed in accordance with each situation (11, 22-25) and was approved by the team members during group meetings. After obtaining the final confirmation, the examination stations were designed for evaluating clinical competence and implemented.

The facilities required for each test were available in the examination stations, and the examiner was identified by an identification card. After the students were sequentially exposed to the stations, the test was initiated by the examiner, and different stages of the practical exam were conducted within the specified timeframe. After finishing each station, the students moved to the next station for the next test. All students were evaluated in six stations and left the facility after the end of the exam. Code of ethics of this study was K. 90.11.

4. Results

Based on the analysis of qualitative data and review of expert experiences, the main reasons for the inadequacy of clinical skills among nursing students were lack of a coherent curriculum, unavailability of qualified instructors, unsuitable educational environment, and unreliable evaluation. On the other hand, the corrective measures included: Development of educational processes; engagement of experienced instructors; curriculum optimization; optimization of the educational environment of skill laboratories; and assessment of basic clinical skills in OSCE (Table 1).

The analysis of quantitative data showed that the mean age of the students was 18.57 $\pm$ 3.8 years (range, 18 - 30 years). In total, 37 (46.5%) participants were male, and 43 (53.5%) were female. In terms of marital status, two (2.2%) students were married, and 78 (98%) were single. With respect to the field of study, 27 (33.7%) participants were midwifery students, and 53 (76.3%) were nursing students. In addition, 31 (38.8%) students were non-native, while 49 (61.2%) were native.

Based on the findings, there was a significant difference in the scores of basic clinical skills, including injection, evaluation of vital signs, and dressing, between the conventional method (2.24 $\pm$ 0.13) and OSCE (2.13 $\pm$ 0.14) (t = 6.05; P < 0.050). From the viewpoint of students, OSCE had acceptable reliability and accuracy, and the stations were relevant to the educational content and fully equipped. There was a significant positive correlation between the students' opinions about the exam and its effectiveness (P = 0.030) (Table 2).

According to the analysis of open questions, students stated that OSCE increased their motivation and effort for exam preparation. They also pointed out that participation in OSCE scenarios reduced their anxiety and fear of real-life clinical situations and familiarized them with the principles of clinical practice.

5. Discussion

According to the qualitative data analysis, four main themes, including "students' understanding of the field of study", "unsuitable educational environment and facilities", "coherent and efficient educational management", and "effective assessment" were extracted in this study.

Table 1. Themes and Categories Extracted from the Data Analysis

Themes	Categories
Improved student understanding of the field	Students' perceptions and feelings about their professional future
	Students' perceptions and feelings about the clinical environment
	First exposure to the simulated clinical environment and early exposure to the clinical setting
Unsuitable educational environment and facilities	Inappropriate facilities for teaching and practicing basic nursing and midwifery skills in traditional practice rooms
	Non-standard training environments dis similar to real-life clinical setting sand lack of professional or occupational similarities
Coherent and efficient educational management	Development of an uncoordinated educational curriculum based on routine methods
	Inconsistency between the curriculum and different professional skills requirements and basic skills
	Need for experienced instructors and a strong professional background
Effective assessment	Ambiguity in assessment and inaccurate analysis of training
	Inadequate practical efficacy and poor preparation of students
	Disregard for critical situations in clinical settings and need for early preparation
Corrective measures (i.e., curriculum optimization, engagement of experienced instructors, optimization of the educational environment of skill laboratories, and application of OSCE)	Restrictive factors: Inadequate preparation and poor clinical competence of students, unsuitable training environments, and unsuitable assessment methods

Abbreviation: OSCE, objective structured clinical examination.

Table 2. Association of the Participants' Viewpoints About OSCE with Variables: Test Score, Effectiveness and Average Score

Students' Characteristics	OSCE Characteristics					
	Test Score		Effectiveness		Average Score	
	P Value	r	P Value	r	P Value	r
Station relevance	0.506	0.04	0.055	0.13	0.099	0.100
Equipment and facilities	0.338	060.06	0.717	0.02	0.466	0.500
Test time	0.353	0.06	0.493	0.04	0.846	0.010
Test accuracy and reliability	0.431	0.05	0.914	0.08	0.967	0.003
Total score	0.662	0.03	0.030	0.15	0.080	0.120

Abbreviation: OSCE, objective structured clinical examination.

The underlying causes of problems and deficiencies in the clinical skills and preparation of nursing and midwifery students included inefficient curriculum development, lack of qualified instructors, unsuitable educational environment, and unreliable assessment. Engagement of experienced instructors in teaching nursing and midwifery techniques is of particular importance in strengthening the organizational structure.

The corrective measures in this study included curriculum optimization, optimization of the educational environment of skill laboratories, and basic clinical skills assessment using OSCE. The quantitative analysis of one of the corrective measures, i.e., implementation of OSCE, was indicative of its effectiveness. Based on the findings, there was a significant difference in the students' skill scores between the conventional method and OSCE ($P < 0.050$).In a study by Alinier, 93% of students and 94.4% of instructors reported that OSCE was a useful and appropriate method for clinical evaluation. It should be noted that this test has particular requirements in terms of space, facilities, environment, and financial and human resources (26).

We did not face any particular problems during the study, as the OSCE examiners were experienced instructors or involved in the training of nursing principles and skills. Due to space limitations of the skill laboratory, the designed examination stations had limited space. There-

fore, efforts were made to administer the exam in a suitable environment with a pre-fabricated wall in an organized manner, and one of the training classes was renovated.

From the perspective of students, OSCE is more reliable and accurate than the conventional method and increases their motivation, effort, and preparation for the test. The results of multiple studies have confirmed the satisfaction of instructors and students with this evaluation method. In this regard, a study by Furlong et al. reported that OSCE is an objective evaluation method rather than a subjective one (27). Generally, the possibility of random responses reduces in clinical assessments using OSCE. In addition, OSCE has relatively higher validity and reliability than the conventional method; therefore, it is possible to carefully examine the skills using an appropriate tool (checklist)for each skill. Newble also reported that objectivity increases in the OSCE method due to the use of checklists by examiners (28).

Validation of nursing education plays an important role in improving the quality of education. Use of proper educational and evaluation methods has increasingly expanded in academic education (15, 29). For many years, healthcare professionals have been looking for valid and reliable methods, which could effectively measure the clinical competence of students. Evidence suggests that routine assessment of students is limited to their acquired knowledge and discards their clinical skills. In fact, evaluation determines how well the educational system's performance is in accordance with its objectives (15, 30).

Previous research shows that OSCE is a clinical examination, which improves the students' performance and promotes their professional roles. It is also a valid method for assessing the students' technical and clinical skills, with the highest validity, reliability, and applicability (31). Nursing faculties need to move towards improving the quality of their educational processes, using action research as part of higher education in medical sciences, to continuously correct and overcome the existing deficiencies (4).

Although there is often no systematic mechanism in clinical skills education centers to control or improve educational quality and balance performance with goals, evaluation of the course of "nursing and midwifery principles and techniques" and continuous improvement of the quality of educational processes in these centers are essential through optimal use of resources for describing nursing education standards. It is also necessary to improve nursing clinical skills training in order to assign standards for nursing education and promote the quality of clinical education in nursing.

The limitations of this study included barriers to teamwork for coordination, lack of educational and assessment facilities, props, and space, and dual role of the researcher (research and organizational roles). In order to investigate the effectiveness of corrective measures and actions and to improve the quality of clinical education, action research studies and assessments in other related domains are suggested.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: Esmat Nouhi: The design and development of the proposal run and collect data Compilation of the article; Hakime Hosainrezaee: Collaborate on the implementation of the project.

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Dental Students' Perceptions of Dentist-Patient Interactions: An Exploration of Empathy in Dental Students

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Abstract

Background and Objectives: Healthcare providers must endeavor to treat patients with empathy if they expect to practice successfully. Empathy is especially relevant to dentists who provide treatment that is usually associated with pain and invasion of personal space boundaries. A 2011 study by Konrath and O'Brien showed that undergraduate college students have less empathy than the past generations. Anecdotal reports and the author's personal experiences also suggest a reduction in empathy among current dental students. This study was designed to assess empathy in a dental student cohort at a dental school in the United States.
Methods: This study examined empathy levels in third- and fourth-year dental students at a dental school in the United States using existing validated medical education psychometric assessments modified for dental education. Specifically, the Jefferson scale of physician empathy-health professional (JSPE-HP) and patient-practitioner orientation scale (PPOS) questionnaires were modified for use in the dental education domain by substituting the word "dentist" for "physician" and replacing "medical procedures" with "dental procedures." E-mails were sent to all 240 third- and fourth-year dental students at the Rutgers school of dental medicine (RSDM) inviting them to participate in a brief online survey about their perceptions of dentist-patient interactions.
Results: Of the 240 invited students, 84 participated in the survey (27%). All questions were answered with a high empathy rating except for two questions - "It is difficult for me to view things from my patient's perspective" and "I can treat and relate best to patients who look like me and have similar beliefs." The calculated Cronbach's coefficient alpha was 0.71 indicating acceptable internal consistency reliability.
Conclusions: This study did not confirm the hypothesis that students lacked empathy. Only two statements were answered in ways that suggested a decrease in empathic cognition. The responses to the open-ended questions provided an insight into the students' self-interested thought processes.

Keywords: Empathy, Dental, Dental Education, Dental Student

1. Background and Objectives

Basic to each human's psyche is the need to feel understood, loved, and cared for (1). In today's competitive healthcare environment, successful practitioners express themselves by communicating with warmth and appreciation for patient's feelings. Such interpersonal communications are the essence of empathy.

Hojat et al. defined empathy as a cognitive attribute that involves an understanding of the inner experiences and perspectives of another person combined with a capacity to communicate this understanding (2, 3). As such, empathy is multi-faceted. To be empathetic, a caregiver must have both the capacity and desire to "take a walk in another's shoes" and the ability to communicate with the "owner of the shoes." Clinicians with empathic communication skills have been shown to produce better patient health outcomes, and "Communication and Interpersonal Skills" is listed as the third domain in the American dental education association's competencies for the new general dentist (4, 5).

A study by Konrath et al. showed that undergraduate college students have less empathy than the past generations (6). Although widely studied among medical students and those of other health disciplines, to date, empathy has received limited attention within the domain of dental education (7-13). Most of the limited published dental research report moderate overall empathy scores

and document that empathy may decrease throughout students' dental education tenure; however, varying study designs make accurate comparisons difficult (7-13). Anecdotal reports of dental educators and the authors' personal experiences similarly suggest a reduction in empathy among current dental students.

A variety of empathy assessment instruments have been validated, primarily in medical education research such as the Jefferson scale of physician empathy-health professional (JSPE-HP), the patient-practitioner orientation scale (PPOS), Interpersonal Reactivity Index (IRI), the E-scale, and the empathy quotient-short (2, 14-17). Sherman and Cramer reported that the JSPE-HP could reliably and validly assess the levels of empathy in a dental school population (12). Additionally, Krupat et al. showed that the PPOS could be utilized to determine whether physicians were doctor- or disease-centered versus patient-centered (14, 18, 19). The primary aim of this study was to use modified statements from the JSPE-HP and PPOS to evaluate the current status of empathy within a select dental school student population. Empathic levels would be compared to those of medical students and utilized as baseline data for future comparisons.

2. Methods

The study was approved as exempt by both the institutional review boards at Rutgers school of dental medicine and the University of the Pacific. An e-mail cover letter was sent to all 240 third- and fourth-year dental students of the Rutgers school of dental medicine (RSDM) inviting their participation in an online survey. This dental school has a 4-year curriculum, with years 1 and 2 consisting of pre-clinical education and years 3 and 4 involving clinical patient interactions. Because cognitive empathy is the capacity utilized during health professionals' patient interactions, only the third- and fourth-year dental students were selected for the study because they had experienced patient care.

The survey was sent from the director for institutional effectiveness at the RSDM inviting the students to participate in a brief online survey about their perceptions of dentist-patient interactions (2015 Survey Monkey; Palo Alto, Ca.). The survey was opened on September 11, 2015, with a follow-up reminder letter sent two weeks later. The study was subsequently closed on September 27, 2015. No incentives were offered for participation in the survey, and all responses were anonymous. The authors were careful to mask the intent of the survey by naming it "Dental Students' Perceptions of Dentist-Patient Interactions" to mitigate any potential bias.

The initial questions asked the basic demographics: gender and age. Following this, 13 statements were adapted from the JSPE-HP and PPOS (2, 3, 14, 18, 19). The questions were adapted from the JSPE-HP and PPOS for dental students by substituting the word "dentist" for "physician" and replacing "medical procedures" with "dental procedures." The students were asked to rate these statements on a five-point Likert scale (strongly agree to strongly disagree). An example of these statements is "I treat patients as if they were partners in their treatment."

The scoring and wording of the questions are shown in Table 1. Both scales had negative and positive wordings to control for acquiescence bias. A total empathetic score was calculated for each question (Figure 1). Wilcoxon signed-rank tests were used for comparing the rating between our modified statement and the original JSPE-HP or PPOS statement (Table 2). The average total score was compared between males and females and between the two age groups using two-way analysis of variance (ANOVA) (Table 3). The internal consistency reliability of the empathy rating was analyzed using Cronbach's coefficient alpha. IBM SPSS Statistics 21 software (IBM, Armonk, New York) was used to analyze the data. The null hypothesis was that no differences in empathy would be measured between any evaluated groups, with the significance level set at $P < 0.05$.

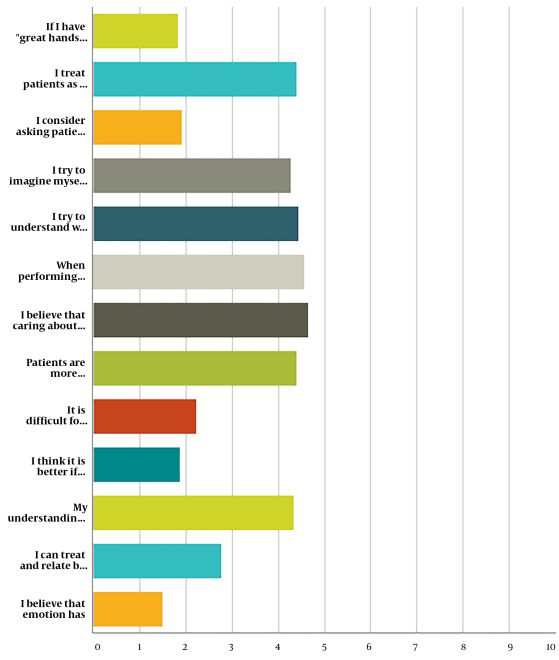

Figure 1. Empathy rating scale scores

Additionally, students were asked six open-ended ques-

Table 1. Empathy Rating Scale Results[a]

Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	NA	Total	Weighted Average
1. If I have "great hands," create anatomic functional restorations and cause little to no pain it is less important that I communicate well.	39 (44.83)	37 (42.53)	2 (2.30)	5 (5.75)	4 (4.60)	0 (0.00)	87 (100)	1.83
2. I treat patients as if they were partners in their treatment.	0 (0.00)	1 (1.15)	5 (5.75)	38 (43.68)	42 (42.28)	1 (1.15)	87 (100)	4.41
3. I consider asking patients about what is happening in their lives an unimportant factor in understanding their ailments.	33 (37.93)	39 (44.83)	5 (5.75)	9 (10.34)	1 (1.15)	0 (0.00)	87 (100)	1.92
4. I try to imagine myself in my patients' shoes when providing care to them.	0 (0.00)	2 (2.30)	9 (10.34)	36 (41.38)	38 (43.68)	2 (2.30)	87 (100)	4.29
5. I try to understand what is going on in my patients' mind by paying attention to their nonverbal cues and body language.	1 (1.15)	1 (1.15)	3 (3.45)	34 (39.08)	45 (51.72)	3 (3.45)	87 (100)	4.44
6. When performing dental procedures I should "check in" with the patient at regular intervals to determine their comfort level.	1 (1.15)	1 (1.15)	0 (0.00)	28 (32.18)	54 (62.07)	3 (3.45)	87 (100)	4.58
7. I believe that caring about the well-being of a patient is an important therapeutic factor in dental treatment.	1 (1.15)	0 (0.00)	1 (1.15)	23 (26.44)	58 (66.67)	4 (4.60)	87 (100)	4.65
8. Patients are more comfortable in the dental chair when I understand how they are feeling.	1 (1.15)	0 (0.00)	5 (5.75)	36 (41.38)	48 (49.43)	2 (2.30)	87 (100)	4.41
9. It is difficult for me to view things from my patients' perspective.	14 (16.09)	47 (54.02)	19 (21.64)	6 (6.90)	1 (1.15)	0 (0.00)	87 (100)	2.23
10. I think it is better if patients do not have a full explanation of their dental procedure.	33 (38.82)	38 (44.71)	9 (10.59)	2 (2.35)	3 (3.53)	0 (0.00)	87 (100)	1.87
11. My understanding of my patients' feelings gives them a sense of validation, but that is therapeutic.	1 (1.15)	0 (0.00)	9 (10.34)	34 (39.08)	42 (48.28)	1 (1.15)	87 (100)	4.35
12. I can treat and relate best to patients who look like me and have similar beliefs.	11 (12.79)	34 (39.53)	17 (19.77)	11 (12.79)	13 (15.12)	0 (0.00)	87 (100)	2.78
13. I believe that emotion has no place in the treatment of illness.	56 (64.37)	23 (26.44)	4 (4.60)	3 (3.45)	1 (1.15)	0 (0.00)	87 (100)	1.51

[a] Values are expressed as No. (%).

tions about their relatively new relationships with their patients. These questions were intended to qualitatively examine student introspection concerning their relationships with their patients.

3. Results

The survey was e-mailed to 240 students, with 84 responding (27%). Of these, 60% were female and 40% male. The age of the students ranged from 20 - 36 years, with the median age group of 20 - 25 years. A two-way ANOVA showed that there were no significant differences in the total scores between males and females (P = 0.174) and between the age groups of 20 - 25 years and 26 years and older (P = 0.247). The descriptive statistics for gender and age group and two-way ANOVA results are shown in Table 3.

The calculated Cronbach's coefficient alpha was 0.71 indicating that the internal consistency reliability of the empathy rating was acceptable. Wilcoxon signed-rank tests showed that Question #2 (our modified question) had a significantly higher score than question #10 (PPOS#4) (P = 0.033), indicating more empathetic rating for #2 compared with #10. Question #7 (our modified question) had a significantly higher rating than question #11 (JSPE#2) (P = 0.009), indicating more empathetic rating for #7 compared with #11.There were no significant differences in the empathetic rating between question #6 (our modified question) and question #5 (JSPE#4) (P = 0.083) and between question #8 (our modified question) and question #4 (JSPE #4) (P = 0.156). Table 2 shows the empathetic rating comparisons.

The dental students answered all questions with a high empathy rating except for two questions - "It is difficult for me to view things from my patient's perspective," and "I can treat and relate best to patients who look like me and have similar beliefs." For the first statement, 26 students answered neutral or agree to strongly agree, and for the second statement, 41 students answered the same (Table 1).

The six open-ended questions were intended to continue the students' thought processes on human interactions. Many participants used these questions as an opportunity to voice their frustrations with the clinical scholastic issues within the dental school. For example, when asked "What kind of support would be helpful to you in achieving ideal relationships with patients?" one student replied, "Being complimented on doing a good job on the procedure by the faculty or not being embarrassed if I don't know what I am doing or if I made a mistake." When asked the question, "Please describe what was challenging about the transition from mannequin practice to patient treatment?" many students listed all of the dental procedures that they did not feel qualified enough to perform on a live patient. Only 16.4% of students mentioned patients and communication when answering this question.

Table 2. Wilcoxon Signed-Rank Test Result for Empathetic Rating Comparisons Between Selected Questions

	Question	Medium	P Value
#2 vs. #10	#2. I treat patients as if they were partners in their treatment.	4.5	0.033*
	#10. It is often best for patients if they do not have a full explanation of their dental condition. (PPOS#4)	4.0	
#6 vs. #5	#6. When performing dental procedures I should "check in" with the patient at regular intervals to determine their comfort level.	5.0	0.083
	#5. I try to understand what is going on in my patient's mind by paying attention to their nonverbal cues and body language. (JSPE#4)	5.0	
#7 vs. #11	#7. I believe that caring about the well-being of a patient is an important therapeutic factor in dental treatment.	5.0	0.009*
	#11. My understanding of my patients' feelings gives them a sense of validation that is therapeutic. (JSPE #2)	4.5	
#8 vs. #4	#8. I try to imagine myself in my patients' shoes when providing care to them.	5.0	0.156
	#4. I try to imagine myself in my patients' shoes when providing care to them (JSPE #1)	4.0	

Table 3. Descriptive Statistics for Gender and Age Group and Two-Way ANOVA Result

	N	Mean ± SD	P Value
Gender			0.174
Female	49	54.6 ± 4.8	
Male	34	54.2 ± 4.7	
Age group, y			0.247
20 - 25	41	54.5 ± 5.0	
≥ 26	42	55.6 ± 4.6	
Interaction of Gender and age group			0.824

4. Discussion

Many years have passed since Hojat and Gonnela wrote physician empathy: definition, components, measurement and relationship to gender and specialties (2). Since then, the psychometrically proven JSPE test (all forms) has been used in a myriad of research studies examining empathy. In 2005, Sherman and Cramer adapted the JSPE for use with dental students in their study entitled measurement of changes in empathy during dental school (12). That study documents that health professions students begin their education with a theoretical expectation of empathic practice; however, this virtuous intent often dissipates. Sherman and Cramer posit that the decline in empathy could be a defense mechanism that accompanies fear and insecurity when new health practitioners first begin treating patients or may be due to emulation of the peers (12).

In 2009, Yarascavitch et al. examined empathy among students at two Canadian dental schools using a hybridized assessment instrument designed to distinguish between emotive and cognitive empathy (13). Emotive empathy is considered an innate ability to unconsciously respond to the emotions of others whereas cognitive empathy is largely a conscious drive to recognize accurately and understand another's emotional state. In that context, cognitive empathy is the capacity utilized during health professionals' patient interactions. Yarascavitch et al. reported increases in cognitive empathy that coincided with the dental school tenure (13).

A 2015 study by Raja et al. surveyed patients to help generate ideas for changes in the dental school curriculum regarding patient rapport and empathic communication (20). The patients clearly reported feeling dehumanized by their student doctors. Similarly, in 2006, Henzi and Davis surveyed dental students and found that the students "worried that dental education requirements made it difficult to prioritize patients' needs" (21). They felt that "procedures were done for the sake of requirements without looking at the patient holistically."

The results of the current survey showed that, in general, students have an appreciation of empathy. Only two questions specifically found contrary outcomes. Despite replicating a well-validated medical education empathy survey, the current results may not reliably translate to

a true reflection of dental students' empathic behaviors. Two potential biases may have impacted the outcomes of this survey: selection bias and demand characteristics. First, selection bias could have occurred if only more empathic or less empathic students chose to participate in the survey. To mitigate the possibility of such bias, the provided title of the survey was intentionally void of any mention of empathy.

Behavior in an experimental situation, such as this survey, can be affected by a bias termed "demand characteristics." Demand characteristics are when participants form an interpretation of the experiment's purpose and subconsciously change their behavior to fit that interpretation (22). As such, dental students may have answered to meet their expected objectives of the survey. Students with poor attitudes toward patients may know what answers are expected of professional dentists; however, their ideals and actions may be misaligned.

The answers to the open-ended questions were far from the expected qualitative examination of student's thought processes on human interactions. When asked a question like "What kinds of support would be helpful to you in achieving ideal relationships with patients?" the students' responses addressed faculty and scheduling systems. This may indicate that their primary concern is not thinking about their patient. This finding becomes magnified when, earlier in the survey, these students were queried with 13 statements to rate their perceptions about patients.

Some answers were poignant, however. When asked about effective communication, one student replied, "sometimes I get too focused on the procedure I am performing, and I forget to communicate." Many spoke about the difficulty of explaining procedures to patients where language or hearing was a barrier. Some spoke about patients indirectly; for instance, when asked what was challenging about the transition from mannequin to patient, many mentioned saliva, tongue, cheeks, and patients' inability to open wide. When asked about support for ideal relationships, a student stated that he/she would like more training on management of patients with phobias, anxieties, and other psychiatric conditions.

The self-directed responses to the open-ended questions may be a reflection of this generation of dental students. Much has been written recently in trade journals and mainstream media about the millennial generation and their apparent inability to look others in the eye when communicating (23). Their social skills or lack thereof have been honed staring at a phone or computer screen (24). The effects of these generational conditions on empathy, however, are unknown.

In reviewing the literature on empathy and healthcare providers, most research studies reported that female subjects demonstrate greater empathy than males (6, 25). This gender difference was not substantiated in our study. This result could be attributed to the small sample size.

4.1. Conclusions

From the observations of students treating patients, the authors hypothesized that there was an empathic gap in the "soft" skills of dental students. A novel hybridized survey instrument was used. Only two statements were answered in ways that suggested a decrease in empathic cognition. Consequently, this study did not confirm the hypothesis that students lacked empathy. The responses to the open-ended questions provided an insight into the students' self-interested thought processes and suggested the students' incapacity to communicatively act on what they inherently know.

As empathy requires both verbal and nonverbal communication skills, inadequate communication can adversely impact dentist-patient relationships. A directive built into the clinical curriculum, specific for communication and empathic dental student behavior, may be a way to build-on or encourage these skills in students as would requiring discussions on humanism and empathy in all clinical evaluations and treatment. Further research is needed to determine the best pedagogical practices.

Footnote

Conflict of Interests: The authors declare no conflict of interests regarding this work.

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Training Professionalism Using Hidden Curriculum in an Internship Course: Account of Experiences of Undergraduate Students of Surgical Technology

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Abstract

Background: Medical students are in direct contact with patients due to their clinical situation, and one of the important goals of medical education is professional development of these students.
Objectives: The purpose of this study was to explain students' experiences regarding professionalism training using hidden curriculum.
Methods: This study was carried out through content analysis, and data were collected through semi-structured interviews with 6th and 8th semester undergraduate students of surgical technology. The participants were entered into the study using the purposive sampling method and each individual interview lasted for about 35 - 45 minutes. Semi-structured questions were used to conduct the interviews and then follow-up and exploratory questions were used to clarify the concept and to deepen the interview process.
Results: Overall, 358 primary codes and the two main themes of observing patient rights and professional accountability were extracted. The theme of observing patient rights includes three sub-themes, including observing patient privacy, respect for patient's dignity and patient safety, and the theme of professional accountability comprised the three sub-themes of compliance with professional standards, professional communication and instructor as ethics teacher.
Conclusions: Professors' familiarity with the training and development of professionalism among medical students, and attention to the role of hidden curriculum in the formulation of values, norms and behaviors regarding professionalism is suggested.

Keywords: Professionalism, Hidden Curriculum, Explanation, Student

1. Background

Professionalism is defined as the constant and informed use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflections in daily performance for personal and social interests (1). It includes a set of views and behaviors that require medical students, physicians and health professionals give priority to patients' interest rather than their own personal benefits. In fact, professionalism can be viewed from the two perspectives of professionalism advantages and the requirements and responsibilities associated with it (2, 3).

Since medical students are directly involved with patients due to their clinical situation, and patients' human and personal territory is at risk as a result of diagnostic, therapeutic, and medical care activities, it can be stated that one of the important goals of medical education is the development of professionalism among students (4). Universities all over the world, with an emphasis on professionalism education and its important role in shaping professional personality and the related behaviors, consider professionalism training as one of the most challenging issues in medical education (5-8).

Students, in addition to acquiring knowledge and practical skills, need to learn professional attitudes in the formal curriculum (9). In contrast, learning in medical education mostly occurs outside the formal and predeter-

mined curriculum, which is known as hidden curriculum (10). The first description of the term "hidden curriculum" was first used in the 1960s and it has been commonly used in medical sciences education since 1994 (11).

Hafferty and Franks stated that this type of training is a process of transferring ethical culture, norms and principles related to the emotions and behaviors of medical students in the clinical setting. Also, it was acknowledged that only part of this culture is formally transferred to students in curriculum hours, but acceptable values, beliefs and behaviors in medical education are more likely to be established through the hidden curriculum (12). The results of previous studies showed that the hidden curriculum is one of the most important factors influencing the process of teaching and learning in the clinical environment as "the transfer of implicit beliefs, attitudes and unfulfilled behaviors" This curriculum has a great influence on students' professional development (13). In other words, the hidden curriculum is a non-documented and unwritten medical education where professional performance is dictated by the powerful and enduring social and cultural forces that govern the clinical environment (14).

Several researchers have emphasized the importance of hidden curriculum for the professionalism of students, and some even consider it to be stronger than the formal curriculum (9-11, 14), because the hidden curriculum is a powerful tool that can even change confident individuals (15). Some studies have shown that students have identified examples of ethical challenges in clinical settings, and their results indicated the contradiction between what is learned through the formal curriculum and experiences in the clinical setting. In addition, the ethical effects of the hidden curriculum can hinder students from having the right choice in different situations (16, 17).

Results of a qualitative study aimed at using the hidden curriculum for professionalism training among medical students showed that the hidden curriculum is highly powerful in the professional formation and development of students. Students believed that by looking at the unethical and non-professional behavior of faculty members in the clinical setting, they would generally develop a negative attitude toward professors, and in some cases, fundamental changes would occur in their attitude (13). In another research, students considered the hidden curriculum to be as professional and unprofessional behaviors of faculty members (18).

The hidden curriculum causes the formation of professionalism among medical students in clinical situations. Medical students' understanding can reflect the question that: "Is the current teaching and learning process improving their professional behaviors and values?" (19).

The comprehensive program of higher education in Iranian health system for actualizing the goals of the Health System Development Plan is a strategic document based on which upstream documents such as the 1404 Perspective document, mapping of scientific communities, the Health System Development Plan and the Comprehensive Scientific Health Plan have been developed. One of the major policies outlined in this program is institutionalization of professional ethics in medical education with a focus on developing and implementing a comprehensive hidden curriculum management program to instill professional ethics and professionalism in higher education institutions (20).

In this regard, it can be admitted that students taking clinical and internship courses understand the effects of this phenomenon on their personal and professional development. Due to the different dimensions of the hidden curriculum and its broad role in the development of students' ethical, social and professional personality, it is not possible to use quantitative methods to deeply explore students' living experiences. Undergraduate students in the field of surgical technology are no exception in this regard. According to the curriculum, these students should complete 34 units of internship credit during the undergraduate course, which indicates the extensive presence of these students in clinical situations and the formation of their professionalism in the clinical setting.

2. Objectives

Therefore, the present study aimed to delve into undergraduate surgical technology students' experiences of professionalism training through the hidden curriculum in internship courses.

3. Methods

This study, using the content analysis method, delineates the experiences of undergraduate students of surgical technology of professionalism training through the hidden curriculum in the clinical setting during the academic year of 2011 - 2012. Qualitative content analysis can be considered as a method of subjective contextual interpretation of textual data through systematized and codified processes, thematization, or designing known patterns. This method allows researchers to interpret the originality and truth of the data subjectively, but scientifically (21).

Semi-structured interviews were used to collect the data. The samples were sixth and eighth semester undergraduate students of School of Paramedicine, Golestan University of Medical Sciences, who had history of at least

one internship course in the operating room environment. The samples were selected through the purposive sampling method followed by theoretical sampling. We tried to include those with different experiences and have maximum diversity of data. Sampling was continued until reaching data saturation, meaning that interviews continued until no new data were extracted. Therefore, interviews were conducted with 17 informants and each interview lasted between 35 and 45 minutes. Semi-structured interviews were used to conduct the interviews.

At the beginning of the interviews, the purpose of the study was explained so that the interviewees felt comfortable. Then, the main question was asked. The interviews were held in classrooms and during the students' break time so that the participants would participate more easily and actively. Examples of the questions are as follows: "What do you think of when I say professionalism training or clinical professionalism?", "Have you experienced any professional behaviors in clinical education?", "Who provided these trainings (instructor, staff, surgeon)?", and "Has the hospital's condition affected your professional training? How? Please give me an example?" The rest were follow-up and exploratory questions asked based on the data provided by the participant to clarify the concept and gain a deeper understanding in the interview process.

With coordination and permission of the participants, the entire interview was recorded by a digital voice recorder, and immediately after the completion of the interviews, they were transcribed verbatim. After each interview and before the next interview, the researcher analyzed the data several times. Data analysis was performed using the Graneheim and Lundman method (22). The steps involved in data analysis were as follows. At first, the researcher converted interviews into textual content and read them several times from beginning to end in order to gain recognition of the general flow of knowledge.

Then, all the interviews were considered as the unit of analysis that was to be considered and coded. In the following step, words, sentences and paragraphs were considered as semantic units. Semantic units are a set of words and sentences that are related to each other in terms of content. These units were arranged according to their content. Then, the semantic units reached the level of abstraction and conceptualization according to their latent meaning and were codified. Afterwards, the codes were compared with each other in terms of their similarities and differences and classified under more abstract categories with a specific label. Finally, the categories were compared and contemplated and the latent contents contained in the data were introduced as the main themes.

To ensure the reliability and validity of the data, the proposed criteria of Guba and Lincoln were used (23). The researcher tried to establish credibility with prolonged engagement and sufficient interaction with the participants as well as verification of the gathered information with them. Dependability was achieved through performing step-by-step replication, collecting and analyzing data, reviewing by the supervising professor and consulting with experts. Confirmability was attained through obtaining the approval of faculty members and using their complementary opinions. Thick description was employed to ensure transferability of the data, that is, their applicability in other areas, and to understand the experiences of students of surgical technology regarding professionalism training using the hidden curriculum in the clinical environment. For this purpose, quotations of the participants are presented as they were expressed.

The present study was conducted during two consecutive educational semesters at Golestan University of Medical Sciences among surgical technology students. After gaining approval from the respective educational department and deputy of research, informed oral consent was obtained from the participants to observe ethical considerations and protect the rights of the participants. Before the interviews were initiated, the students were assured of the confidentiality of the data. The interviews were conducted face-to-face at the students' classrooms at a predetermined time. At the beginning of the study, the participants' demographics were recorded.

4. Results

The participants comprised 17 students of surgical technology, nine of whom had enrolled in the sixth semester and eight in the eighth semester. The mean age of the participants was 21.07 years. After identifying the concepts, 358 primary codes were extracted from the interviews and after several reviews, summaries were categorized based on similarities and proportions. Then, with further reviews and comparison of categories, their latent meaning was identified as the primary theme, and these themes were also named conceptually.

Based on data analysis, the two main themes of observing patient rights and professional accountability were extracted. Observing patient rights contained three subthemes, namely observing patient privacy, observing patient's dignity and protecting patient safety, and the professional accountability theme had the following subthemes: Compliance with professional standards, professional communication and instructor as the ethics teacher. It should be noted that some of the basic concepts extracted from different categories overlapped; thus, the authors classified them into some themes according to their greater impact (Table 1).

Table 1. Primary Codes, Subclasses and Main Themes Obtained From Interviews with the Participants

Main Theme	Sub-Themes	Primary Concepts
Professionalism training using the hidden curriculum		
Observing patient rights	Respect patient's privacy, respect for human dignity, and protect patient safety	Maintaining patient coverage, observing gender matching, obtaining informed consent, confidentiality, minimizing errors, ignoring race and ethnicity of patients, accepting patients with any socioeconomic level, observing sterility, preventing the patient from falling, leaving the patient after surgery, observing the standard principles in the use of equipment, having sufficient and updated knowledge
Professional accountability	Compliance with professional standards, professional communication and instructor as an ethics teacher	Having proper appearance in the workplace, observing sterility of the surgical field, being honest in performance, reducing patients' anxiety before surgery, having effective communication, making jokes and a lot of noise when having a patient with local anesthesia, judging patients, joking and using inappropriate words at patients' bedside, instructor's attitude toward patients, giving confidence to students by the instructor in stressful situations, the supportive role of instructor for the patient, the observance of justice by the instructor in caring for patients, decisiveness in cases of error, having a sense of compassion towards the patient, health recommendations of instructors on occupational hazards, familiarity with professional principles of the operating room, having moral literacy

4.1. Respecting Patient Rights

This theme included three sub-themes, namely observing patient privacy, respecting patient's dignity and respecting patient safety, which were derived from students' experiences of professionalism training using the hidden curriculum. Behaviors such as informed consent, confidentiality of patient information, maintaining with patient coverage, compliance with gender-matching in the operating room, and heedfulness while doing procedures to minimize errors in operating room setting. Students considered these factors as their responsibilities and believed that providing these cares can bring patients peace and support.

4.2. Observing Patient Privacy

Students considered one of the components of professional development in the clinic to be patient's privacy observance by the treatment staff in the operating room. Most of the participants knew that protecting patient privacy was important to maintain and build trust and to reduce anxiety and stress among patients before, during and after the operation because of specific patient coverage in the operating room. The solution proposed for this case was the general effort of the operating room personnel, so that the patient also understands compliance with this issue by the treatment staff. One of the participants said, "When a female patient is in the operating room and she is religious, the presence of male personnel can make her anxious as she is naked. The staff try to ensure gender-matching between the patient and the staff in the operating room. In fact, this is a professional behavior and as students, we learn this positive behavior." (participant No. 7, 21-year-old girl).

Some students reported lack of confidentiality in some staff, which is a breach of patient rights and professionalism. A participant stated: "They brought a woman to the cesarean section, she was scared and crying and trembling. The circulating nurse of the room asked her the reason, the patient said that I am afraid of the operation, and I was the second wife and I'm divorcing my husband... The circulating nurse began blaming the patient and said irrelevant stuff to her. Then, she spread the word to everyone, and unfortunately, people went to see who this person was ..." (Participant No. 10, 23-year-old girl).

4.3. Observing Patient's Dignity

Most students found that the consequence of good manners and peaceful communication, regardless of race, religion, age, gender or socioeconomic status, may in some way be a manifestation of reverence for human dignity at the clinical setting. Also, with respectful attitudes and respect for human dignity, satisfaction is seen in the eyes and faces of patients. One of the participants in this regard said: "I do not live in Golestan province, I'm a student here. There are different races and religions in Golestan province (Turkmen, Fars, Kazakhs, Kurds, Sunnis and Shiites, Sistani and Baluch). It's very inspiring when we see that in the operating room none of these are taken into consideration and everyone is the same. Early on, it was very difficult for me, I was a bit racist, but now I see myself the same as others, and none of these factors affect my patient care in the operating room." (Participant No. 2, 23-year-old girl).

Another participant said: "When I talk with my patient respectfully or calmly, or even move him to his bed slowly and carefully, I see satisfaction from his look and smile." (Participant No. 15, 22-year-old boy).

4.4. Preserving Patient Safety

Observing patient safety in the operating room environment in a variety of ways, including sterilization, unconscious patient care, and use of advanced equipment, is of utmost importance. The studied students were in direct contact with these complicated situations. They considered observing patient safety standards among the factors affecting quality of care in the operating room, which benefit patients and prevent harm. By carefully observing the proper functioning of each other, while preserving patient safety, professionalism is mastered in a hidden way. One of the participants in this regard stated: "I'm always very careful about gauze count and appliances. The instructor always emphasizes that a professional technologist should be fully conscious of gauze count and equipment in any circumstances. If the personnel forget to do so, I would remind them of that. Under no circumstances will I leave the patient alone until the time of delivery to the recovery room, because the chance of patient fall in the operating room is too high." (Participant No. 1, 22-year-old girl).

Students had experiences at patient's bedside that were indicative of maintenance of patient safety and learning of professionalism. They pointed out that working according to scientific principles and having sufficient knowledge about anatomy, surgical equipment and patient safety are important to become a professional. A participant added: "Work must be accompanied with sufficient knowledge and expertise. Based on books and references ... sterilization, mastery of anatomy, knowledge of surgical instruments and patient safety tips are very important in the operating room ... It is possible, for example, not knowing the correct positioning of the patient and protecting the patient's nerves in different positions, an irreversible event happens for the patient. When we see a surgeon, for example, is sensitive to supporting the patient's organs in laminectomy, it creates a sort of sensitivity in us and it's a form of learning." (Participant No. 8, 23-year-old girl).

4.5. Professional Accountability

This theme consists of three sub-themes of compliance with professional standards, professional communication and instructor as ethics teacher, which includes students' professional training experiences using the hidden curriculum in the clinic. They acknowledged that in addition to acquiring knowledge and learning specific skills, they should learn the attitudes and values of their field of study. Also, they believed that in response to community and accountability, their performance should be based on standards and professional principles, which can be actualized through conducting themselves towards respect for professional promotion. A participant mentioned: "The factors that make up professional behaviors and create professional status in the community are first of all, appearance that is very important in the operating room environment and then meeting the standards of the profession. As a result, others see that were behave and act in a professional manner." (Participant 12, 23-year-old girl).

4.6. Compliance with Professional Standards

Most students have stated that one of the important issues in maintaining professional standards in the operating room environment is sterilization in the operating room environment and during surgery. According to the students' views, this concept is closely linked to one of the areas of professional ethics and students' professionalism known as honesty in performance. They stated that honesty plays a significant role in maintaining professional standards. A student stated: "Once, one of the circulatory staff unsterilized the surgical field, although I saw it and told her, she pretended she didn't hear me and continued, but I told the instructor, or once again, a surgeon's glove was torn and nobody had noticed, I informed him and he was so pleased. Sterility is a very important matter and must be respected." (Participant 12, 23-year-old girl).

Another participant stated: "I think we should be careful about keeping the environment sterilized and complying with professional standards. Sometimes, students do not announce it when they unsterilized the field or do something substandard because of fear, but anyone who unsterilized the field must declare even if it results in bad behaviors or punishments because not declaring it is so unprofessional." (Participant No. 1, 22-year-old girl). Another student added: "Surgeons and other members of the health care team should take care of their gowns, sometimes their gowns touch the ground while they are trying to wear them, but they don't care... or they wear nail polish in the operating room ... surely, the patient and the responsibility they have are not important to them." (Participant No. 5, 23-year-old boy).

4.7. Establishing Professional Communication

Many students considered the ability to communicate properly and to establish interpersonal communication among the responsibilities of operating room staff. They acknowledged that effective communication between staff, surgeons, patients, students, or even instructors could have a profound effect on the quality of care due to the existence of a complex group work in the pursuit of patient's therapeutic goals, and it reflects professionalism in the clinical setting. A participant stated: "When

we accept a responsibility, we must consider all its consequences and take into account all aspects of professionalism. Being professional is defined in ethics and proper behaviors with classmates, personnel, and patients." (Participant 12, 23-year-old girl). "Unfortunately, in the operating room there is a lot of unprofessional communication that has an adverse effect on our profession, and I do not like it at all, but I see a lot of students do the same thing. For example, a surgeon shouts at the staff or students for any reason, or when the patient is conscious, the surgical team joke and have unprofessional conversations. In all of this, effective communication between the surgical team is undermined, and ultimately, the quality of care and our profession are degraded." (Participant No. 6, 24-year-old boy).

Most participants believed that proper treatment, empathy with patients, and creating mental relaxation in patients had a profound effect on professionalism. "Proper behavior with patients, such as kindness and compassion, is one of the key principles of professional ethics and professionalism. I always try to accompany the patient to the operating room bed and try to give her peace of mind and lower her anxiety." (Participant No. 17, 22-year-old girl).

4.8. Instructor as Ethics Teacher

Students' experiences in this field indicate that the instructor in the clinical setting plays an important role as an ethics teacher. The relationship between the instructor and his/her students and the health care team as well as his/her professional performance have been introduced as an ethics model. Instructors teach ethics and professionalism directly and, in some cases, indirectly and unwittingly. "I think the instructor can be very good at teaching ethics and professionalism with his behaviors and performance, which makes me able to reinforce this behavior in myself, for example, when the instructor acts very calmly and decisively in cases of unsterilization, it's very important to me." (Participant No. 7, 21-year-old girl). "Instructors are like our models. One of the instructors taught us about professionalism and truly acted upon it." (Participant No. 14, 22-year-old girl).

"A patient had cesarean section and was stressed. Our instructor took her hand and talked to her and gave her a massage for a bit. At last, the patient became very relaxed and prayed for her." (Participant 11, 21-year-old boy).

5. Discussion

In the present study, we investigated students' experiences of professionalism training in clinical settings with respect to the role of hidden curriculum in the professionalization process. The results of the experiences of surgical technology students regarding professionalism training using the hidden curriculum while passing the internship course consisted of two main themes: Respecting patient rights and professional accountability. The theme of patient rights was composed of three sub-themes including patient privacy, respect for human dignity, and patient safety.

One of the findings of this study was learning the principles of respecting patient rights in the clinic, such as confidentiality and respecting patient's privacy. The first condition for observing patient rights is to have sufficient knowledge of patient rights in the operating room. The results of many studies show that students of various fields of medical sciences often witness unethical conduct by health providers during their studies and are placed in positions where they are forced to have an unethical action. Therefore, students' awareness of the patient rights is very important in the clinical setting (24-26).

In the study of Karimyar Jahromi et al. 60% of students considered professors as the source of their knowledge of patient rights (27). Heshmati and Darvispour concluded in their research that the causes of non-observance of patient rights and dignity in medical centers were personnel's unawareness (28). Mirmoghtadaie et al. also ascribed that, based on the viewpoint of students and professors in the clinical setting, continuous education and updating of the target group in this regard could boost ethical decision-making and sustained practice could enhance professionalism (29). What is important is that learning ethical principles is not enough for medical students, but adherence to these principles is also of paramount importance as it can be effective in promoting community health and quality of patient care.

Another notable concept extracted from the interviews is the concept of patient privacy in the operating room. In general, respect for privacy is one of the fundamental rights of every human being. Attention is paid to the dignity and privacy of patients in all religions and cultures, and even in countries where the issue of hijab does not exist, observance of patient privacy in their therapeutic systems is very much considered (30).

In this regard, the United Kingdom's national health service regarding patient rights states that women should always have access to a female care taker and have a companion of their own gender. Personnel examining a patient should be of the same gender or a companion of the same gender should be present there (31). In the study of Dehghani et al., the level of respect for patient privacy was moderate. They stated that in order to increase patients' trust and satisfaction and improve the services provided, the observance of patient privacy should be emphasized by the clinical staff (32).

By conducting a study on patient-centered human care, Jouzi et al. referred to the theme of having a human look to patients. Participants based on their experiences expressed that a competent student is one who is able to communicate with the patient appropriately and, after gaining trust and while respecting patient's privacy, use care programs according to requirements and needs (33).

In the present study, the results of the analysis of students' experiences showed that compliance with gender matching and patient privacy in the operating room environment are very important because of the special coverage of the patient, which can cause anxiety in patients, especially among women. Also, it seems that the need to generalize and extend the range of gender matching is felt more in the operating room environment because patient's coverage is lower due to treatment needs.

Mostaghimi et al. reported that the perception of patient privacy, patient information confidentiality, and mandatory constraints regarding the use of social media in the clinical setting as acceptable behaviors is influenced by a variety of factors. Modifying behaviors of undergraduate students requires a cultural change toward continued medical education in this area and frequent reminders for faculty members, students and clinical staff. Students who see unprofessional behaviors are more likely to engage in these kinds of behaviors (34).

Since the operating room is the heart of every hospital, observance of safety precautions to prevent the consequences of medical errors has always been considered (35). Although many interventions have been undertaken in recent years to reduce medical errors and improve patient safety, the organizational culture governing the healthcare environment remains one of the major barriers to patient safety culture. The patient safety culture is a set of individual values and beliefs about patient safety rooted in the culture of that organization. In the literature concerning observing patient safety and having patient safety culture, education has been emphasized (36).

One of the ways to improve patient safety and promote culture is to change the educational preparation of medical sciences students. Medical education included patient safety in its agenda through changing the curriculum and emphasizing patient safety. The students also acknowledged that one of professionalism principles in the clinical setting is to maintain patient safety. The results of studies conducted in this area indicated that students are constantly focused on proper procedures and routine responsibilities and are less concerned with dealing with patients' needs and concerns, which are part of the patient safety concept (37). A possible reason is that less clinical education focuses on patient-centered care values and provides inadequate training on person-centered skills (32).

Another theme in the present study was professional accountability with the three sub-themes of compliance with professional standards, professional communication and instructor as ethics teacher. The students' experiences while learning professionalism showed that the instructor as an ethics teacher can play a significant role in training professionalism in the clinical setting through formal and hidden training. In a research accounting professionalism in medical students, in the main theme of cultural factors, the subthemes of clinical modeling (factors associated with the professor), students' intrinsic and acquired factors, environmental conditions, and human factors were introduced. Clinical experiences, modeling behaviors of faculty members and medical staff, and formal lectures on professional ethics were all the basis for individual development in the field of professional ethics, and clinical experiences and modeling were considered as more important roles (29).

Haider et al. also stated that professionalism and professional communication are shaped by proper education, creation of an environment for the facilitation of learning by the teacher, patient care and pursuit of professional growth (38). As a result, teacher-student interaction, especially at the patient's bedside and the educational clinic, plays an important role in shaping the student's personality and creating self-confidence, which indirectly affects the way in which he / she behaves with the patient (39). Mossallanejad and Morshed Behbahani also emphasized the importance and impact of the professional attributes of professors on learners and stated that they are very effective in creating educational motivation, ethical and human attitudes, and human skills (40). This dimension was also emphasized in areas where professors are considered as a model and the impact of different dimensions of morality and personality are highlighted.

Each member of the medical staff is responsible for the community and for ensuring that his performance is in accordance with the standards and professional principles. Today, one of the most important indicators of hospitals' superiority is their level of accountability and responsiveness of their employees (25).

Students in this study considered themselves accountable and responsible for the community, and one of the educational concepts learned in the clinical environment was responsibility. Factors such as listening to the patient, observing politeness, respect and kindness, gaining patient's trust with honesty, confidentiality, empathy and accessibility, being purposeful in providing care, maintaining patient-centeredness, and using simple and concise sentences and not complex medical terms can contribute to accountability and effective communication in a thera-

peutic and professional relationship (26, 27). This was in agreement with the results of the present study, and these are the factors students learn in clinical education and on the route to professional development.

Finally, it can be admitted that the hidden curriculum makes medical education instructors believe that medical education institutions have a cultural identity and as a kind of ethical society define "good" and "bad" concepts in medicine for students. Most importantly, the concept of hidden curriculum makes medical educators see it as a cultural process that is permanently influenced by external forces and internal problems and factors. Therefore, the main challenge for medical education professionals is to perceive what messages are transmitted by the structures they create or develop, and what effects they can have, especially in terms of professionalism (39). Considering that most surgical technology students, like other medical sciences students, learn educational concepts in clinical settings, their observations and experiences in this environment can affect their attitudes toward their field of study, future occupation and their professionalism process.

Given the qualitative nature of the present research, there was the possibility of forgetting some experiences or unwillingness of students to express their real experiences and emotions that could be considered as a limitation of the research. Also, considering that the study was performed at one faculty only, we suggest performing this study in other faculties and regions to facilitate more comprehensive planning and provide a more favorable environment for learning professionalism using the hidden curriculum.

5.1. Conclusions

The participants presented two main themes and six sub-themes as concepts learned in clinical education. These lessons are more in the form of hidden curriculum and reflect the importance of the hidden curriculum and the tacit transfer of professionalism characteristics. In this context, positive and negative experiences in professional learning have been reported in clinical education. Negative experiences can lead to unprofessional and unethical behaviors and have a negative educational effect on the formation of professional behaviors. Therefore, it is necessary to accurately and continuously identify the hidden curriculum, and in addition to direct teaching of professionalism, solutions should be put forward to counteract the negative consequences and strengthen the positive outcomes of the hidden curriculum. Targeted clinical education in line with professionalism education, further familiarity of professors with professionalism and the role of the hidden curriculum in this regard, attention to emulation of values, norms and attitudes by students, integration of professional criteria in evaluation forms, systemic monitoring of students and professors' performance and performing interventional studies are suggested.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

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Interprofessional Shared Decision-Making: Assessment of Behavioral Intention Though a Tool Based on the Theory Planned Behavior

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Abstract

Objectives: The present study was conducted with the aim of psychometric evaluation of a tool measuring behavioral intention in relation to interprofessional shared decision-making based on the theory of planned behavior and its assessment among medical and nursing students.

Methods: This descriptive study was carried out in two stages. In the first stage, the psychometric properties of the interprofessional shared decision-making (IP-SDM) tool were evaluated based on experts' opinions. In the second stage, the participants' behavioral intention was evaluated using the mentioned questionnaire. The questionnaire consisted of five domains of cognitive attitude (2 items), emotional attitude (2 items), subjective norms (3 items), perceived behavioral control (3 items), and intention to use interprofessional shared decision-making (3 items). Content validity of the questionnaire was evaluated qualitatively and quantitatively (using the content validity ratio (CVR) and content validity index (CVI)). Cronbach's alpha coefficient and interclass correlation coefficient (ICC) were used to determine the reliability of the questionnaire. In the second stage, the data were analyzed using descriptive statistics (mean and standard deviation) and Pearson's correlation test in SPSS software.

Results: Qualitative and quantitative content validity of the questionnaire was confirmed based on experts' opinions. The internal consistency of the tool, based on the Cronbach's alpha coefficient, was 0.92, and the tool's repeatability was calculated at 0.84 using ICC. Participants in the study intended to participate in interprofessional shared decision-making.

Conclusions: The behavioral intention measurement tool in relation to interprofessional shared decision-making based on the theory of planned behavior has good validity and reliability in Iran. Regarding the participants' behavioral intention to participate in shared decision-making, it is suggested that a suitable platform for shared decision-making and teamwork between health team members be provided in educational systems.

Keywords: Shared Decision Making, Decision Making, Shared Interprofessional, Theory Planned Behavior, Behavioral Intention

1. Background

The shared decision-making approach has been considered in recent decades as one of the factors influencing the achievement of patient-centered care. The objective of the shared decision-making approach is to integrate patient-centered and evidence-based medicine through sharing information about the benefits and risks of all options available to the patient. Shared decision-making emphasizes effective communication with various members of the health care team and the patient, and takes into account the patient's values and preferences and the informed decision of the patient (1, 2), which can reduce medical errors and improve health outcomes (3, 4).

Shared decisions are hinged upon various factors, such as relationship with the patient, attention to patient preferences, interaction of different professions with each other and with the patient, negotiation of a decision between different members of the health care team, and resolution of any conflict between them.

In interprofessional collaboration and shared decision-making, the health care team can be considered as a three-dimensional triangle, where the physician, patient, and other health professions form its main dimensions (5). Therefore, establishing effective communication and collaboration between them is one of the prerequisites for implementing a patient-centered approach (6). Interprofessional collaboration and communication skills have been identified as the most important shared decision-making abilities (7). Interprofessional collaboration is defined as the collaboration of different health personnel with different professions with each other,

patients, patient families, other health personnel, and the community to provide quality treatment (8). One of the components emphasized in interprofessional collaboration is the realization of shared decision-making, which is expected to be effectively actualized in the collaborative process between patients and members of health care team in order to reach the best decision (9, 10).

An interprofessional education platform in educational systems creates a process where a group of students or health care providers with different educational backgrounds are trained in a certain period of time. In this process, interaction is an important goal in developing collaboration for the provision of health promotion services, prevention, treatment, rehabilitation, and other health services (11). Interprofessional education is expected to promote collaboration between professionals (6, 12).

Recently, the application of theory in the design of educational programs has been emphasized (13). The application of theory in the education and evaluation process leads to a systematic approach to creating and sustaining change among participants and can guide the teaching-learning process and the assessment of educational outcomes (14).

Legare et al. used the theory planned behavior to examine the behavioral intention of health team members in shared decision-making. They concluded that the participants' intention to participate in interprofessional shared decision-making in providing home-based primary care was positive (4). Considering that the theory planned behavioral constructs addresses individual and environmental factors, it can be appropriate for determining the effective factors in interprofessional shared decision-making. In this study, based on the nature of the interprofessional approach and the influence of various factors such as environmental and attitudinal indices on shared decision-making, the theory planned behavior was adopted. This theory emphasizes on behavioral intention and attitudinal constructs as factors influencing behavioral change. Based on this theory, behavioral intention is the most important determinant of behavior in an individual.

The theory planned behavior is a completed form of the reasoned action theory, where behavioral intention is the most important predictor of behavioral change. Behavioral intention is defined as the probability that a person decides to behave in a certain manner. This theory consists of three constructs. "Attitude towards behavior" is defined as the reaction or position of an evaluator who agrees or opposes a position, individual, or group, which is expressed in the form of feelings, beliefs, and even individual behavior. "Subjective norms" is a predictor of behavioral intention and arises from normative beliefs approved or rejected by the authorities in the community. In other words, it is the effect of the social pressure perceived by a person to behave or not to behave in a certain manner. This factor is evaluated by the extent of individual's motivation to meet those expectations. The third construct is "perceived control" that depends on the two factors of the existence or absence of facilitators or barriers to behaviors and the extent to which each situation affects the difficulty or ease of performing a behavior (14).

Legare et al. have used several studies to explore interprofessional shared decision-making models and dimensions and have used interprofessional shared decision-making tools based on the theory planned behavior (10, 15).

In the present study, the factors affecting shared decision-making were determined based on the theory planned behavior using a mixed method. Considering that the issue of shared decision-making and interprofessional collaboration is one of the major challenges of the health system at the level of health care team, creating a tool for determining the status of members of health care teams and planning for improvement based on its results can be helpful.

2. Objectives

The present study was conducted to assess the psychometric properties of a tool measuring behavioral intention to participate in shared decision-making and determine the status of medical and nursing students in this regard.

3. Methods

This was an analytical cross-sectional study performed in 2017 at Tehran University of Medical Sciences in two stages. In the first stage, the validity and reliability of the shared decision-making tool were determined based on an interprofessional approach using the opinions of experts in the field. The tool used in this study was the interprofessional shared decision-making (IP-SDM) questionnaire that was developed and validated in the studies by Legare et al. (4) and Stacey et al. (16). This questionnaire consists of five domains of the intention to use interprofessional shared decision-making (3 items), subjective norms (3 items), perceived behavioral control (3 items), cognitive attitude (2 items), and emotional attitude (2 items). In the study of Legare et al., the Cronbach's alpha coefficients for each of the domains of intention to apply interprofessional shared decision-making, subjective norms, perceived behavioral control, cognitive attitudes, and emotional attitudes were 0.87, 0.75, 0.78, 0.74, and 0.88, respectively (4). Each item score ranged from -3 (completely disagree) to +3 (I totally agree).

In the first stage, the inclusion criteria for validity assessment phase were of working experience in clinical skills centers or communication skills courses and in research on behavioral change theories. In this stage, according to previous studies, 10 experts were entered into the study to evaluate face and content validity of the questionnaire. For the evaluation of reliability, we enrolled medical and nursing students with at least one semester in clinical practice.

In the second stage, the participants' behavioral intention was evaluated using the questionnaire. In this stage, samples were medical and nursing students of Tehran University of Medical Sciences who were chosen using the stratified random sampling method. In so doing, individuals were divided into two strata based on medicine and nursing fields. Then, they were randomly entered in the present study. Sample size was calculated at 97 with acceptable error value of 0.05, acceptable mean difference of 0.5, and expected standard deviation of 2.5. Thus, in each group, approximately 50 people were assigned based on field of study (nursing or medicine). A total of 120 questionnaires were distributed, 110 of which were completed. It is worth mentioning that 50% of the sample size (n = 48) was included in the study to assess the reliability of the questionnaire.

The face and content validity (quantitative-qualitative) and the reliability of the tool were examined. First, the questionnaire was translated separately by two professors with a good command of English, and a Persian version was prepared by comparing the two translated versions. In the next step, back translation was performed by a fluent English translator who did not know the content of the original questionnaire. In the final step, by comparison of this version and the original English questionnaire by experts, the Persian version of the tool was finalized.

In the first phase of the study, to assess the face and content validity of the questionnaire, a consent form and the Delphi-based implementation guide were sent to the experts. After two weeks of implementing Delphi's first round, expert opinions were gathered. The researchers, while respecting privacy and confidentiality, added all the suggestions in a separate column to the original framework and sent them back to the experts for confirmation. The experts were asked to submit their supplementary comments regarding the items of the questionnaire (Delphi's second round). After two weeks, the comments were collected and analyzed and sent for the implementation of the third round. In this round, no new opinions were added.

Then content validity indices including content validity ratio (CVR) and content validity index (CVI) were calculated. To determine CVR, the experts were asked to choose from the three options of "necessary", "useful but not necessary" and "not necessary" for each item (17). According to the Lawshe table, the minimum CVR value was obtained (CVR > 0.62). The CVI value of each item in the questionnaire was also evaluated using a four-point Likert scale (18). In order to assess the reliability of the questionnaire, internal consistency and repeatability of the tool were assessed by means of the test-retest method. For this purpose, each participant completed the questionnaire at a two-week interval.

To evaluate behavioral intention with regard to interprofessional shared decision-making, the participants completed the mentioned self-report questionnaire.

Internal consistency was established using Cronbach's alpha coefficient and repeatability was tested using interclass correlation coefficient (ICC) (19, 20). In the second stage, descriptive tests (mean and standard deviation) were used to determine the students' behavioral intention. The relationship between the intention scores and demographic variables and field of study was also determined by Pearson's correlation test. Finally, the data were analyzed using SPSS version 19.

The present study was approved by the Ethics Committee of the National Center for Strategic Research in Medical Education of Tehran (ID = 960914).

4. Results

In the validity assessment stage, 10 experts were participated, four of whom were experts in medicine, three were experts in planned theory, and three were experts in clinical education. The participants were 6 women (60%) and 4 men (40%) with a mean age and mean work experience of 49.3 $\pm$ 4.2 and 10.2 $\pm$ 4.6 years, respectively. Also, 48 nursing and medical students participated in the reliability assessment phase, including 23 males (47.91%) and 25 females (52.28%). Their mean age was 23.2 $\pm$ 2.3 years. In the second stage, 110 students (50 nursing students (45.5%) and 60 medical students (54.5%)) with the mean age of 25.04 $\pm$ 3.90 years were enrolled. Of these, 44 (40%) were male and 66 (60%) were female.

Based on the results of this study, the validity of this tool was confirmed by the experts. The results of CVR calculation showed that according to the Lawshe table, all the items in the questionnaire obtained values of more than 0.64 in this index and remained in the questionnaire. In calculating CVI, all the items obtained values of more than 0.79 and remained in the questionnaire. Finally, the content validity of the questionnaire was confirmed quantitatively and qualitatively. Internal consistency of the tool was established by Cronbach's alpha coefficient of 0.92 and its repeat anility was confirmed by ICC of 0.84 (Table 1).

Table 1. Reliability Indices of the Tool Measuring Behavioral Intention for Interprofessional Shared Decision-Making

Domains	ICC	Cronbach's Alpha
Intention to apply	0.73	0.89
Subjective norms	0.77	0.86
Perceived behavioral controls	0.76	0.80
Cognitive attitude	0.75	0.88
Emotional attitude	0.71	0.84
Total questionnaire	0.84	0.92

Abbreviation: ICC, interclass correlation coefficient.

The participants' mean score regarding intention to participate in interprofessional shared decision-making was 1.11 $\pm$ 0.51 (Table 2). Correlation test was used to determine the relationship between the intention scores and demographic variables (age and sex) and field of study. Based on the results of this study, there was a significant relationship between the students' behavioral intention and their age (P = 0.001, r = 0.33), field of study (P = 0.001, r = 0.54), and gender (P = 0.040, r = 0.19).

5. Discussion

Based on the theory planned behavior, behavioral intention is defined as one of the most important predictors of behavioral change. In this study, the psychometric properties of the instrument for measuring behavioral intention of participants were evaluated, and the results indicated that the mean scores of participants in relation to shared decision-making were positive, that is, they intended to participate in shared decision making.

In the patient-centered approach, emphasis is placed on respectful treatment and responding to patients' preferences, needs, and values in order to ensure that clinical decisions are guided by patient values. In this definition, the importance of collaborative work between the patient and the health care team to create the best possible outcomes has been emphasized (21).

In order to educate and direct members of health care teams to implement a collaborative and patient-oriented approach, educational plans and evaluations should be tailored to that end. The use of appropriate and theory-based measurement tools is important in the orientation of educational programs. In the present study, the tool was based on the theory planned behavior and its psychiatric properties were established using experts' opinions. The results showed that the instrument for measuring behavioral intention in relation to shared decision-making has good validity and reliability in Iran. Studies have mainly emphasized on assessing attitudes, and most results have been positive in relation to attitudes towards shared decision-making (4). Although based on theory, behavioral intention has been identified as a predictor of behavior; limited studies have been conducted on behavioral intention in relation to shared decision-making (22). Using a psychometric tool can help determine the factors influencing interprofessional shared decision-making.

Behavioral intention as an effective factor in behavioral change is a complex concept that affects attitudinal constructs, subjective norms, and perceived behavioral control. The results of this study revealed that the participants intended to participate in shared decision-making. The cognitive attitude and perceived control associated with shared decision-making had the highest mean scores among the studied constructs. Considering the positive attitude that affirms the consent of individuals with interprofessional shared decision-making process, the perceived control construct measures the facilitators or barriers to perform a behavior.

In fact, planning for creating facilitating opportunities and factors supporting shared decision-making can provide a platform for shared decision-making in clinical settings. In various studies, the perceived control factor has been identified as one of the factors influencing behavioral intention (4, 23), which was consistent with the results of this study.

Legare et al. in a study based on the theory planned behavior enrolled participants from various professions including nurses, social workers, occupational therapists, physiotherapists, nutritionists, and physicians to provide home-based treatment services. The results showed that although the team members collaborated with each other, the factors affecting their behavioral intention were diverse. The results of their research showed that the type of occupation affects behavioral intention and shared decision-making (4). In the study by Legare et al., the two factors of perceived control and subjective norms among nurses and emotional attitudes among rehabilitation staff influenced behavioral intention. Therefore, it is necessary to consider educational interventions proportional to the factors affecting behavioral change among members of different professions (4).

Based on the results, there was no significant relationship between the scores of behavioral intention and field of study. This finding could be due to limited sample size and the limited number of occupations enrolled in the research. Deschenes et al. (23), in a study on the basis of the theory planned behavior examined the factors affecting the behavioral intention of dieticians to choose shared decision-making in two types of behaviors related to providing different treatment options and clarifying the patient's preferences. They concluded that the factors affect-

Table 2. Participants' Intention to Participate in Interprofessional Shared Decision-Making

Theory Planned Behavior Concepts	Mean ± SD	Range	
		Maximum	Minimum
Behavioral intention	1.24 ± 0.65	2.67	-0.67
Subjective norms	0.87 ± 0.72	3.00	-1
Perceived behavioral controls	0.91 ± 0.55	2.00	-3
Cognitive attitude	1.63 ± 0.79	3.00	-2
Emotional attitude	1.06 ± 0.67	2.33	-1
Behavioral indentation to shared decision-making	1.11 ± 0.51	2.07	-0.29

ing the choice of shared decision-making differed in these two behaviors, and only the perceived control factor was similar in both behaviors.

In behaviors related to the clarification of patient preferences, "professional attitudes and norms", and in the behavior of providing treatment options to the patient, "subjective and moral norms" were effective (23). Guerrier et al. found that behavioral intention to participate in shared decision-making had no effect on the physicians' intention to choose the use of clinical guidelines. Training shared decision-making also did not affect it (1).

In sum, it can be stated that the behavioral intention of individuals in different behaviors is affected by various factors that can be addressed in different studies. Further studies are recommended to investigate the factors affecting behavioral intention in various treatment behaviors as well as the factors affecting the attainment of behavioral intention and behavior. The use of mixed methods can help determine the status of health care team members in relation to shared decision-making and explain the factors influencing the choice of shared decision-making behavior.

In this study, one of the factors affecting the process of patient-centered care and interprofessional collaboration was studied. In this regard, the status of medical and nursing students was also evaluated. The results showed that planning for the use of various mechanisms such as training to improve people's intention to use interprofessional shared decision-making is necessary. In this study, an interprofessional approach to medicine and nursing fields, which are considered to be the main health team professions, was adopted. It is suggested that other team members from different professions be investigated in future studies. Also, the limited sample size can be considered as a limitation of this study. In addition, only the face and content validity of the questionnaire was determined in this study, future studies are recommended to evaluate the construct validity of this tool.

5.1. Conclusions

The findings of this study showed that the tool for measuring behavioral intention in relation to interprofessional shared decision-making based on the theory planned behavior has good validity and reliability in the context of Iran. Also, the participants intended to participate in interprofessional shared decision-making. Therefore, proper planning taking into account factors affecting behavioral intention in relation to interprofessional shared decision-making is necessary in order to provide a suitable basis for achieving shared decision-making and teamwork among the members of the health team in educational systems.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: Fatemeh Keshmiri, design and analysis of data; Jamileh Salar, data collection.

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A Meta-Analysis of the Effectiveness of Educational Technologies in Medical Education

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Abstract

Objectives: Considering the contradictory evidence on the effectiveness of educational technologies, this meta-analysis was conducted to evaluate the impact of these technologies on medical education.
Data Sources: This meta-analysis was conducted based on secondary analysis methods. The analysis included experimental and semi-experimental studies on the effectiveness of educational technologies in the medical education of Iran. The census sampling method was applied in this study, and 54 studies were identified as relevant based on the inclusion and exclusion criteria. For data collection, a researcher-made checklist consisting of three sections, i.e., bibliographic information, methodological information, and findings, was completed. Finally, the Comprehensive Meta-Analysis (CMA) software was used for analysis of data.
Results: Among different educational technologies, multimedia education, E-learning, and computer-mediated learning using compact discs and software packages had significant effects on medical education; therefore, use of these technologies was effective in medical education. According to our findings, multimedia education (effect size, 1.793) was considered to be the most influential virtual technology in medical education. In general, all educational technologies were effective in the medical education of Iran; however, their effectiveness was insubstantial. Considering the area under the normal curve, the average effectiveness of educational technologies was 63% higher in the virtual education groups, compared to the controls without virtual education.
Conclusions: One of the most important issues in medical education and training is preparation of an engaging learning environment for students, which can be realized through a variety of educational technologies. However, for optimal effectiveness, complementary use of virtual technologies along with traditional methods or their integration in other educational approaches is suggested.

Keywords: Technology, Virtual Education, Medical Education

1. Context

Today, the importance of quality improvement in medical education is increasing rapidly. Although the prevailing instructional methods involve the teacher's presence in the classroom, some believe that with the advent of modern educational technologies, students can distance themselves from traditional approaches and move towards new learning methods. There are new communicative practices and opportunities, which can facilitate learning outside the classroom. In fact, students are encouraged towards self-learning through information technologies to improve their learning experience (1).

Currently, most educational studies and instructors are looking for effective ways to present educational content to students and maximize learning (2). Therefore, educational systems are carefully monitored to determine if adequate attention has been paid to the learning of students. Previous studies have emphasized on the idea that educational institutions should devise alternative teaching methods in order to guarantee high levels of knowledge and skills among students after graduation (3).

Recent developments in information technologies have led to the design of new teaching models and approaches. The majority of university instructors use face-to-face lectures traditionally, while technological advances can be utilized to provide a better learning environment for students (4). Over the past decade, changes in the learners' characteristics, economic development, and Internet technology have caused changes in the educational environment. As a result, many instructors are now examining new educational models to ensure the success of graduates (5).

New and accessible technologies are often incorpo-

rated to improve traditional education and foster educational processes (6). One of the most widely used technologies in recent years is "virtual education". Several definitions have been proposed for virtual education from different standpoints. In general, virtual education is a novel educational approach, which can be used to facilitate simple and inexpensive access to educational resources and services through communication technologies (e.g., electronic devices), regardless of time and place. In other words, virtual education implicates education and learning based on electronic tools (7, 8).

Application of virtual technologies can help medical students examine different scientific phenomena using proper tools, data collection techniques, and scientific models and theories in physical (interactions with the material world) or virtual (simulations) laboratories (9). On the other hand, healthcare education is faced with clinical constraints and increased demand for online education (10). Generally, the results of various studies have confirmed the effectiveness of these technologies in education.

Previous findings indicate that virtual education is as effective as traditional education in learning transfer (11). According to the literature, distance learning and information technologies promote vocational education for employment, improve the transfer of learning and learning techniques, and encourage entrepreneurial skills (12). In addition, online interactive engagement has a positive impact on student learning (13). Overall, capacity development for the improvement of learning outcomes (14), professional skills (15), and effectiveness of virtual educational system (16) is among the educational outcomes of these technologies.

Virtual learning and E-learning can help eradicate many of the current teaching-learning problems owing to their special characteristics: unlimited accessibility; time management; cost reduction; increased productivity; increased motivation; increased contact with the learner; group-work opportunities in multimedia environments and E-conferences; and sufficient spatial and temporal resources for interacting with a large number of applicants for education. In fact, use of virtual learning along with academic education can improve the process of education (17).

Today, knowledge and technology are closely integrated and almost inseparable. The virtual world provides its users with a wealth of resources for knowledge acquisition and offers many educational opportunities due to its interactivity and lack of spatial and temporal constraints (18). In other words, if the medical education system seeks to promote knowledge and technology, it should be prepared for a vital systematic change and take advantage of new technologies with respect to educational goals.

2. Objectives

Many studies have been conducted on the effectiveness of a variety of virtual technologies in Iran. Some studies have highlighted the effectiveness of this type of training in teaching-learning activities, while some have reported its ineffectiveness in medical education. Considering these contradictions in the findings, we need to determine if these virtual technologies are effective or ineffective in teaching-learning activities. Therefore, in the current review study, we applied a meta-analysis method to answer this question.

3. Data Sources

The meta-analysis method was applied in the current review study. Meta-analysis is a statistical technique for summarizing quantitative data from a series of studies. This technique can be used to combine the results of quantitative research and discover new relationships among social phenomena (19). Accordingly, the current study is an applied research in terms of goals and a quantitative study in terms of the applied method and nature of data. The unit of analysis was the quantitative data of previous studies, and the statistical samples consisted of studies on the effectiveness of various educational technologies in the medical education of Iran.

Multiple studies have been conducted on the effects of virtual learning, each incorporating different technologies, i.e., online education, multimedia education, E-learning, video-based education, virtual education, self-learning, computer-mediated instruction using educational software packages and compact discs, mobile learning, web-based education, blog-based learning, and wiki-based learning; nevertheless, each of these studies has reported inconsistent findings. The present review included all experimental and semi-experimental studies on the effectiveness of electronic and virtual technologies in medical education in 2005 - 2017; these studies were selected to evaluate the effects of educational technologies in practice.

On the other hand, educational studies outside the field of medical education were excluded, as medical education studies should not be combined with studies in other teaching realms considering the differences in the teaching domains. The census sampling method was applied according to the study unit. For implementing the meta-analysis, it was essential to develop a framework with respect to the study constraints. Therefore, three sampling frameworks were defined to select relevant studies:

- Full-text articles in IranDoc, SID, Magiran, Noormags, Iranian Human Sciences Portal, Elmnet search engine, Google and Google Scholar, and scientific journals on educational technology, besides checking the reference lists of available articles;

- Dissertations submitted to different universities of the country in line with our research purposes; and

- Government-funded research projects.

To select the primary studies based on these frameworks, proper keywords were determined for search purposes by reviewing the literature. The keywords were selected based on the theoretical framework of the study and expert viewpoints on a variety of virtual and E-learning methods, including "distance learning", "virtual education", "mobile learning", "mobile education", "E-learning", "virtual learning", "programmed instruction", "learning management system", "online education", "compact disc-mediated learning", "software-assisted learning", and "self-learning". In order to improve the search quality, two individuals, who were familiar with the search methods and information sources, conducted the search independently. In addition, an expert in meta-analysis monitored the entire process.

After identifying the keywords, studies were selected based on the inclusion and exclusion criteria. The inclusion criteria were as follows: Studies related to the research objectives; semi-experimental studies; medical education research; and implementation of an appropriate research methodology and a scientific approach. Finally, based on our manual search using the keywords and inclusion criteria, a total of 119 studies were retrieved. The titles of these studies were related to the purpose of our review. As some of these studies were not considered suitable for the final analysis, they were excluded.

The exclusion criteria were as follows: studies with poor methodology and quality; studies extracted from dissertations which were already included in the review; and similar articles or dissertations submitted to different institutions or universities with different titles. In a total of 119 studies, which were retrieved according to the inclusion and exclusion criteria and our keyword search, 14 articles were excluded considering their irrelevant titles (n, 105). Similarly, 32 out of 105 articles were excluded after reviewing the abstracts (n, 73). Also, 19 out of 73 full-text articles were eliminated after reviewing the full manuscripts (n, 54). Finally, a total of 54 national articles were reviewed.

To analyze the data, the effect size index and heterogeneity test were applied. Generally, the most common effect size indices include Cohen's d and r; the former is often used for group differences, while the latter is measured for correlation studies (19). In the present study, Cohen's d index was measured with respect to the semi-experimental analyses and group differences.

For data collection, a researcher-made worksheet was designed to record the primary research data. This tool, which was developed with respect to the required information from the primary research, consisted of three major sections: bibliographic information, methodological information, and findings. In the bibliographic section, information including the study title, type of study, author's name, place of study, and year of publication was extracted.

The methodological section included information, such as the study population characteristics, sampling methods, data collection tools, type of research, and number of groups, while the findings section recorded the reported data of retrieved studies. It should be noted that all studies in our review had inter- and intra-group designs; therefore, when measuring the effect size of studies with an inter-group design, the scores of the case groups were lower than the controls. Also, pretest-posttest differences were calculated to measure the effect size of studies with an intra-group design.

To ensure the accuracy of our review, two evaluators assessed the process. For this purpose, the researcher presented a Likert-scale checklist about the data collection process, including the identification process of articles, inclusion/exclusion criteria, data selection, and effect size indices, to two meta-analysis experts. After assessing the checklist, the evaluators examined the review accuracy and reported any ambiguities to the researcher. After correcting the ambiguities, the researcher presented the checklist again to the examiners. In addition, to confirm its reliability, Cohen's Kappa coefficient was measured in SPSS V. 20 (IBM Corporation, Armonk, NY). Inter-rater agreement was estimated at 0.73, which indicates 73% agreement between examiners in the accuracy assessment.

To investigate the primary research, mixed effect models including the fixed effect model and random effects model were applied. On the other hand, Orwin's Fail-safe N was calculated to evaluate publication bias, and Cochran's Q and I-square indices were measured to study heterogeneity. In addition, due to lack of sensitivity to the sample size, the Hedge's g coefficient was calculated to convert the effect size. All meta-analysis calculations were analyzed in Comprehensive Meta-Analysis (CMA) version 2.

In general, the basic principle in meta-analysis is to calculate the effect sizes for individual studies, convert them to a common metric, and then combine them to obtain an average effect size. Generally, the effect size indicates the magnitude or extent of the presence of a phenomenon in a population and tests a null hypothesis. The importance of effect size has been emphasized following statistical power analysis. A true null hypothesis represents an effect size

of zero, while a rejected null hypothesis shows that the effect size is non-zero. Therefore, effect size is an indicator of the effectiveness and magnitude of experimental interventions, relationships, and differences, with larger effect sizes representing the greater presence of a phenomenon (19, 20).

As mentioned earlier, there are two common indices of effect size, i.e., Cohen's d and r, which are used as measures of difference and relationship, respectively. In the present study, the Cohen's d index was measured considering the nature of our analysis. Cohen proposed that effect sizes of 0.2, 0.5, and 0.8 represent small, moderate, and large effect sizes, respectively (20). In meta-analyses, similar to many other statistical methods, it is necessary to examine the assumptions before analyzing the data. One of the most important assumptions is the absence of anomalies such as outliers (studies with publication bias) and normal distribution of data.

Publication bias occurs in meta-analysis when all studies related to the subject have not been reviewed, and the analysis is not a proper representative of the available evidence. In fact, some studies may not have been formally published for multiple reasons or published in non-indexed journals. When publication bias is present, the final results of the meta-analysis are affected, and the final estimates are biased and inaccurate. Therefore, it is necessary to identify and correct publication bias in the initial steps of meta-analysis in order to improve the validity of findings (21).

Some large effect sizes may occur in the meta-analysis, which can distort the normal effect size distribution; accordingly, they need to be removed for a normal distribution. Sensitivity analysis was applied in our meta-analysis to eliminate the effects of outliers. Although no exact effect size has been specified for outliers in the meta-analysis literature, effect sizes above 2.5 - 3 are assumed to represent the outlier effect sizes (as effect size is a standard score) (20); the outliers were excluded accordingly in our meta-analysis. Generally, the outlier effect sizes are detected and removed in sensitivity analysis, and then, the analysis is repeated.

4. Results

In this study, publication bias was examined by measuring Orwin's Fail-safe N, as presented in Table 1. This measure does not have the limitations of Rosenthal's test, i.e., emphasis on statistical significance rather than clinical significance and assumption of null effect size for missing studies. Orwin's Fail-safe N considers the smallest effect size, which is indicative of clinical or practical insignificance. Also, rather than nullifying the effect sizes of missing studies, a value other than zero is described as the average effect size (20). According to our findings, the minimum effect size was considered to be 0.2, and the average effect size of missing studies was 0.1; the results are presented in Table 1.

Table 1. Orwin's Fail-Safe N Measurements

Variables	Values
Z score for observed studies	0.395
Minimum effect size	0.2
Average effect size of missing studies	0.1
Number of required missing studies	106

As indicated in Table 1, a total of 106 studies with an average effect size of 0.1 were required for a combined effect size of < 0.2. Given the high number of required studies, it can be said that the overall effect size is reliable, and there is no publication bias.

Since all the observed dispersions in the effect sizes are not real, but partly related to random errors, it is necessary to measure between-studies heterogeneity. The initial heterogeneity can be attributed to factors, such as differences among subjects, intervention methods, definition of variables, research design, study location, sampling method, and many other factors. The results of heterogeneity test based on Cochran's Q and I-square indices were 935.363 and 94.548, respectively ($P < 0.001$; $df = 51$).

Considering the significance of Cochran's Q index, studies were considered largely heterogeneous. In fact, this test suggests that the characteristics of studies on educational technologies in medical education vary greatly, and moderating variables should be taken into consideration to determine variances and differences. Also, since the Q index is sensitive to an increase in effect size (possibility of heterogeneity increases relative to an increase in effect size), I-square was measured. This index ranges from zero to 100 and represents heterogeneity in percentage. Overall, heterogeneity in the effect size of primary research increases as the I-square value approaches 100 (21). The I-square index indicated that 94% of dispersion in the distribution of educational technologies in medical education was related to moderating variables.

Since the main objective of meta-analysis is to combine the statistics of primary research into a common metric, the fixed effect and random effect models were applied in our analysis. In the fixed effect model, it is assumed that there is an effect size underlying all analyses, and all differences in the effect sizes of primary research are related to sampling errors. In contrast, in the random effect model, it is assumed that the effect size changes from one study to another. One of the main reasons for this change is the

presence of mediating variables in the relationships between independent and dependent variables (20). Since the results of homogeneity test were significant, indicating the presence of mediating variables, the random effects model was applied to report the results in this study.

The effect sizes of all studies on the efficacy of virtual educational technologies in medical education were determined. The results are presented in Table 2.

According to Table 2, among educational technologies, multimedia education, E-learning, self-learning, and computer-mediated instruction using educational software packages and compact discs were significant; therefore, use of these technologies is effective in medical education. The analysis of self-learning also confirmed its effectiveness. However, given the negative value of the effect size, it can be claimed that effectiveness was in the reverse direction. In other words, traditional or in-person training was more effective than self-learning. On the other hand, multimedia education with an effect size of 1.793 was the most effective virtual technology in medical education. Finally, the results showed that other educational technologies described in the table were not effective enough.

The average combined effect size was 0.369 in the fixed effect model and 0.344 in the random effect model, which was significant at 0.001. According to Cohen's criterion (20) for interpretation of the practical significance of effect size, Cohen's d values were equal to 0.2 (small effect size), 0.5 (moderate effect size), and 0.8 (large effect size). Regarding the average effect size of variables in the fixed effect and random effect models (range, 0.2 - 0.5), the effect size was interpreted as small. Therefore, it can be concluded that all virtual education technologies were effective in Iran's medical education, although the level of efficacy was low.

On the other hand, since effect size is normally reported as a standard score (z score), we can refer to the normal distribution table for interpretations. According to this table, the area under the normal curve represents z scores of 0.34 (start point of the curve) to 0.63. These effect sizes indicate that the average use of educational technologies was 63% more effective in the technology groups, compared to the controls without educational technologies. Moreover, in order to investigate the effect of the quantitative variable of "publication year" in the results, the meta-regression method was applied, the results of which are presented in Figure 1.

The horizontal axis in Figure 1 represents the effect size, and the vertical axis indicates the year of study implementation. In this figure, the large circles represent studies which included a larger sample size and consequently had higher accuracy and weight in the analysis of research data. The slope of the regression line follows an ascending trend, which means that educational technologies in medical education gradually became more effective over time; the increase is significant in Figure 1 (slope = 0.1) ($P < 0.001$). Therefore, it can be claimed that with one unit of increase in the implementation of virtual methods, the effect size and effectiveness of these methods increase by 0.1. In other words, implementation of virtual education methods has become more effective year after year.

5. Discussion

The results of the present study showed that multimedia education, E-learning, and computer-mediated education using software packages and compact discs were the most effective educational technologies in medical education. According to the results, multimedia education was the most influential virtual technology in medical education. In this regard, Hashemi and colleagues concluded that use of multimedia software packages in medical education is associated with increased learning efficacy and long-term storage of information; in addition, this method is easily accessible and more cost-effective than other methods (23). Khoshsima et al. also confirmed the significant effectiveness of multimedia education in nursing training (63, 64).

Today, learning tools and practices have evolved, and students prefer learning methods involving electronic devices, such as cell phones, tablets, and laptops; this preference is attributed to the ease of use and appeal of these devices. In addition, the literature suggests that audiovisual tools can activate the individual's visual and auditory senses, and as a result, lead to deeper learning. In other words, students learn and understand the audiovisual subjects better than theoretical topics, whereas in textbook-based methods, there is more emphasis on the individual's auditory capacity.

Based on the present findings, it can be concluded that all virtual education technologies have been influential in the country's medical education; nevertheless, they have exhibited limited effectiveness, which is almost consistent with the results of several previous studies (37, 38). Overall, the medical education literature confirms the efficacy of virtual education methods as alternative approaches in Iran. Moreover, similar to traditional educational methods, they can be integrated in the educational curriculum (37).

Virtual and in-person teaching methods have almost similar effects on learning (38). Computer simulations facilitate training in a realistic virtual environment (47), and participation in a virtual educational program can improve the attitude of participating students in the course (40). In addition, use of E-learning promotes active and

Table 2. Effectiveness of Different Types of Educational Technologies in Medical Education

Type of Education	References	Frequency	Effect Size (g Index)	Standard Error	P Value
Online education	(17)	1	-0.265	0.736	0.719
Programmed instruction	(22)	1	0.692	0.741	0.350
Multimedia education	(23)	1	1.793	0.775	0.021[a]
Electronic education	(24-30)	7	0.691	0.272	0.011[a]
Movie-based education	(31, 32)	2	-0.771	0.550	0.160
Self-learning	(33)	1	-1.824	0.744	0.014[a]
Virtual teaching	(34-43)	10	0.040	0.206	0.845
Computer-mediated instruction with educational packages and compact discs	(44-54)	12	0.670	0.211	0.002[a]
Mobile learning	(55-57)	3	0.156	0.388	0.688
Web-based education	(23, 58-61)	5	0.500	0.315	0.112
Blog-based education	(62)	1	1.059	0.727	0.145
Wiki-based education	(63)	1	-0.224	0.798	0.779
Fixed effect	Total	52	0.369	0.030	< 0.001[a]
Random effect	Total	52	0.344	0.105	0.001[a]

[a] Significance level at 0.05.

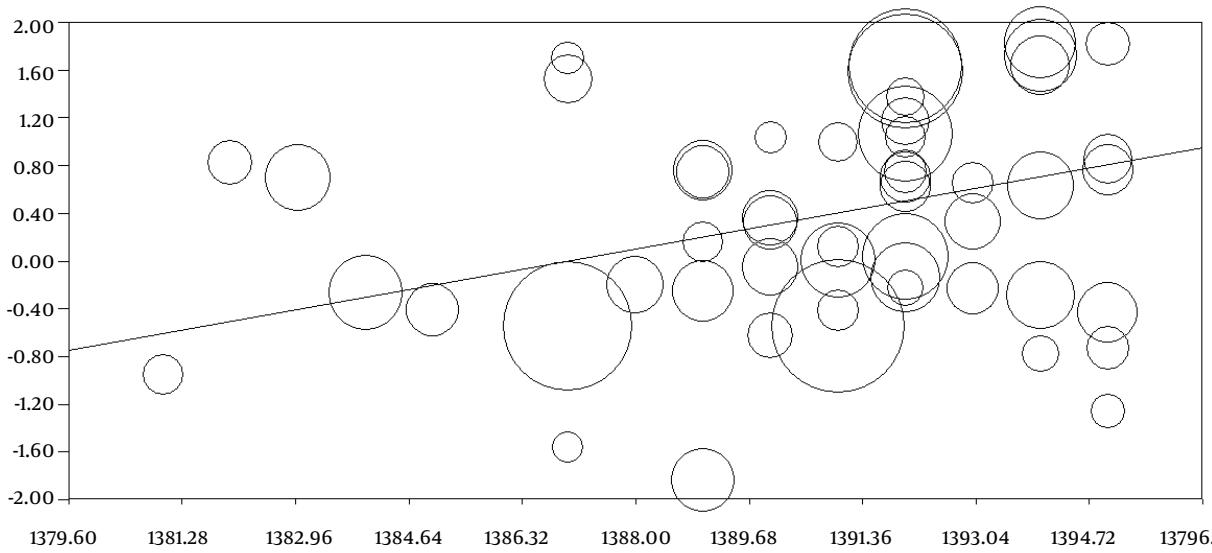

Figure 1. Meta-regression analysis of the effect of publication year

deep learning (48), and instructors can use web-based methods to improve the students' academic achievement and self-efficacy (59). In fact, use of educational software packages significantly influences the students' learning and improves their performance in practical courses (51).

According to the present findings, use of educational technologies can be effective in medical education. As our literature review indicated, incorporation of these technologies as a complementary approach to in-person and traditional methods (42, 50, 63) or their integration in other educational methods can increase the efficacy of education (24, 44). Figure 1 represents the gradually increasing efficacy of educational technologies in the country's medical education. Generally, implementation of educational technologies improves year after year and becomes more comprehensive over time. Therefore, if these meth-

ods are accurately and thoroughly implemented, their effectiveness in medical teaching-learning activities can be guaranteed.

In order to facilitate the development, expansion, and application of E-learning and virtual education technologies, it is necessary to increase the level of students' knowledge in this area and facilitate the implementation of such methods with respect to students' needs and demands (18). It is also recommended to employ virtual methods by providing interesting interactive environments for learners (28). However, despite the students' interest and enthusiasm about the application of these technologies, further analysis is recommended to improve this type of training, given the students' unfamiliarity with the Internet, poor telecommunication infrastructure, and poor quality of the presented content (58).

One limitation of the present study was our emphasis on previous medical education studies; therefore, caution should be taken in generalizing the results to other training methods. Moreover, only national databases were searched in our review, while international databases were discarded. Therefore, some national studies might have been published in international databases, such as PubMed and ISI, which were naturally excluded from our analysis.

6. Conclusions

Considering the recent developments and current status of medical education in our country, one of the most important learning-teaching activities is to create an engaging learning environment for students, using a variety of technologies. Overall, complementary application of educational technologies along with other traditional and in-person teaching methods or their integration in other educational approaches can increase the effectiveness of instruction.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Effect of Blended Education on Nursing Students' Awareness and Attitude Towards Organ Donation: A Solomon Four-Group Study

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Abstract

Background: Organ donation requires management to promote awareness and create the proper culture in all societies. Awareness and attitude of students and nursing staff can affect the process of donating organs.
Objectives: The aim of this study was to determine the effect of blended education on the awareness and attitude of nursing students towards organ donation.
Methods: In this clinical trial study, which used a Solomon four-group design, 94 undergraduate nursing students from Azad University of Sanandaj in 2016 were selected by the census method and randomly assigned to four groups. The data collection tool included demographic data and the Organ Donation Awareness and Attitude Questionnaire blended education was provided to students through a one-day interactive workshop and social networks for 2 weeks. Before and after the intervention, students' awareness and attitude were evaluated. The collected data were analyzed by SPSS 16 using Fisher, Wilcoxon, Mann-Whitney, and Kruskal-Wallis tests.
Results: The comparison of the awareness level after the intervention in the four groups showed statistically significant differences (P = 0.0001). Moreover, there was a significant difference in the attitude level after the intervention between the four groups (P = 0.02).
Conclusions: Blended education increases the awareness and attitude of nursing students. Thus, trainers and educators are suggested using blended education to train students regarding donation. Moreover, it is recommended to include the topic of donation in the nurse's curriculum.

Keywords: Organ Donation, Nurse, Student, Education

1. Background

One of the most complex issues with which human beings have encountered in history is the issue of death, which may seem different from the medical point of view rather the common people's perspectives (1). Brain death generally occurs after damage to the central nervous system due to brain trauma or brain stroke (2). Brain death patients are one of the primary candidates for organ donation (3). According to scientific definitions, if the brain of the person loses the ability to continue its functions, it is considered a dead body. In this situation, if other organs are healthy, they will continue their physiological functions in the body for limited periods (4).

There are approximately 15000 brain deaths per year, indicating high brain death rates in Iran (5). About 50% of cerebral deaths occur in the intensive care units, which needs management to turn them into opportunity (6). The rate of donation in European countries is 20 per million; for Spain, it is reported as 35 per million. The rate in Iran is two per million, which shows Iran still has the potential to improve (7). On the other hand, the deficiency of organs for donation has become a problem today, and the availability of organs is largely influenced by the number of tissue donations (8). In Iran, the proportion of collecting organs for donation is not as satisfactory as in other developing countries (9).

Studies have shown that people's attitude, eagerness, and consciousness have a direct relationship with the issue of donation (10-12). Increasing donation rates in the world, as well as in Iran, have increased the role of nurses in this area (11, 12). Nursing students are not excluded from this rule. The importance of the issue of organ donation is so much that today, a part of specialized nursing care focuses on nursing care in organ donation processes (13). In

the study of Coyle the families of brain death patients described the nursing group as the main care team for receiving emotional care (14). According to Kim et al. nurses play an important role in the identification of organ donors and even post-donation follow-ups (15). The result of a study by Collins shows that there is a direct relationship between the attitude of nurses in the intensive care unit and the increased consent for donating an organ (16). In addition, there is a direct relationship between the attitude of people and taking the organ donation card in nurses in the emergency department and intensive care units (17).

Considering the role of nurses and the effect of their awareness of donation, studies have shown that intensive care unit's staffs, including nurses, are not very prepared for the successful management of donating patients in these centers (18, 19). The study of Manzari et al. in Iran showed that there is not enough awareness and attitude regarding the role of nurses in the process of organ donation (20). Therefore, the issue of organ transplantation and its awareness is a global emergency that needs management to raise awareness and increase the willingness of individuals to donate organs (21). This lack of awareness and lack of up-to-date information, on the one hand, and the extent of nursing staff's enthusiasm as one of the most effective factors involved in promoting this issue, on the other hand, can have a direct negative effect on the number of donated organs (22). Considering the fact that nursing students will be the members of the health care system in the future, raising their awareness can play an important role in creating proper culture (2).

Different interventions have been done to increase the awareness and attitude in the field of donation. Mahdiyoun et al. reported the impact of interactive and non-interactive E-Learning methods on increasing nurses' awareness of the brain death process and organ donation (23). In the study of Azmandian et al. the effect of training by the seminar method on the awareness and attitudes toward donation after brain death was emphasized (24).

Blended education is a goal-oriented convergence between face-to-face education and distance learning, which has been developed by technology and communication (25). Nowadays, blended education as a new method with the goal of using an appropriate combination for each learning problem emphasizes the diverse and widespread use of learning methods, including face-to-face learning, group E-Learning, and individual learning (26).

The key to blended education is the correct combination of materials, methods, and educational strategies that have the greatest impact with minimal cost. It improves the efficiency and effectiveness, decreases costs, and reduces the attendance time in traditional classes. (27, 28). Considering the problems in the field of organ donation, despite the fact that various studies in this area have been conducted in different regions, studies on students are scarce, and there is not adequate information regarding the awareness and attitudes of nursing students as an effective factor in creating proper culture of donating organs in the community. Furthermore, the necessary educations with appropriate methods for the undergraduate nursing students have not been taken into account.

Considering the fact that the waiting list for organ donation in the world is relatively long, many of these patients die prior to the transplantation because of the lack of donated organs and tissues or suffer from low quality of life due to severe and impressive disabilities. Therefore, to improve the status of organ donation in the world and in developing countries such as Iran, it is necessary to identify the factors affecting the number of organ donations and improve the conditions so that the background is prepared for this issue. One of the most influential factors in this regard is the level of awareness and attitude of the community towards the donation and transplantation of organs and tissues (29).

2. Objectives

The aim of this study was to investigate the effect of blended education on the awareness and attitude of nursing students of Sanandaj Azad University towards organ donation in 2016.

3. Methods

3.1. Design

This study is a educational trial with Solomon four-group design that was conducted in 2016 in the Faculty of Nursing and Midwifery of Islamic Azad University, Sanandaj Branch, Iran. This research was registered in the Iranian clinical trial registry (www.irct.ir) with the code IRCT2016091029780N1.

In the Solomon four-group design, the after-only and the before-after designs are combined into one design. The rationale for this combination is that subjects are known to do better on a measurement at the second time they are tested no matter what happened between testing periods. Some learning occurs simply as a result of familiarity with the measuring tool used in pretest or the experience itself. For this reason, this design compares the scores of groups who have not had a pretest (after-only) with the scores of the two groups who have been pretested. Accordingly, in this design, the two experimental groups are contrasted and the two control groups are contrasted to verify the difference in the posttest as a result of the pretest. Then, the after-only groups are contrasted and the before and after groups are contrasted on the dependent variable. Finally, the two experimental groups together are contrasted with the two control groups (30, 31).

3.2. Participants

Using the census method, first and second-semester undergraduate nursing students of Sanandaj Azad University in the academic year of 2016/2017 were included in the study and they were randomly allocated to four groups. The entrance criteria for the study included being Iranian, Muslim, having no history of organ donation or transplantation in family and friends, no employment of the parent or the spouse of the participant under study in the health care system, no participation in the similar research, and lack of clinical experience or employment in health care units. The exclusion criteria included a reluctance to continue the research and not attending all educational sessions or periodic examinations. The number of registered students was 100, two of whom did not participate in the pretest and four did not complete the whole steps of blended education; so, these six subjects were excluded.

3.3. Randomization

The list of all the first and second-semester undergraduate nursing students was provided by the education center and they were coded. Then, all the codes were embedded in a pot. Each time, a code was randomly emptied out of the dish and was written in a group A or B. Then, the code was returned to the dish and then the next choice was made. After dividing all subjects into two groups, the same procedure was repeated for each of the groups to divide each group into two other groups (C, D). This procedure eventually led to the formation of four groups A, B, C, and D. In the beginning, the number of subjects in each group was 25. After the exclusion of six subjects, the numbers of subjects remaining in each group were A = 25, B = 22, C = 23, and D = 24.

3.4. Data Collection

In group A (the first intervention group), a pretest and a posttest (after 2 weeks) were taken. In group B (the first control group), a pretest was performed and posttest was taken after 2 weeks without any intervention. In group C (the second intervention group), without a pretest, similar to the intervention group A, a posttest was taken after 2 weeks of intervention. In group D (the second control group), without a pretest and intervention, a posttest was performed simultaneously with other groups.

3.5. Tool

The data collection tools included demographic data (6 items) and the Organ Donation Awareness and Attitude Questionnaire (29 items). The questionnaire consisted of two sections. The awareness section contained 11 right/wrong questions. Each right answer gave a score of 2 and each wrong answer a score of 0. Therefore, the maximum and minimum scores were 22 and 0, respectively. Three questions had reverse scoring. The second section concerned attitude and included 18 questions scored on a 5-point Likert scale from completely agree (4 scores) to completely disagree (0 scores). Therefore, the maximum score of 72 and a minimum score of 0 were attainable. Four questions had reverse scoring.

3.6. Reliability and Validity

The Organ Donation Awareness and Attitude Questionnaire consisted of 35 questions designed by Haji-Ghaderi and Ghajjhi (32). Upon obtaining permission for using the questionnaire, content and face validity and test-retest reliability were used to determine the validity and reliability of the questionnaire. The instrument was reviewed and corrected by 10 faculty members of the Faculty of Nursing and Midwifery of Kurdistan University of Medical Sciences and Islamic Azad University, Sanandaj. The demographic questionnaire initially included 9 questions, which were changed to 6 questions. Seven questions related to organ donation were changed to 2 questions, and questions related to awareness were changed from 10 questions to 11 questions. For the reliability of the questionnaire, it was completed twice by 30 three-semester undergraduate nursing students and the reliability was approved by using a test-retest method with the intraclass correlation coefficients r = 0.7 for awareness and r = 0.73 for attitude.

3.7. Intervention

First, the research team designed the content of blended education and it was reviewed and modified by 10 faculty members. The educational content in the blended education method was presented via a workshop and virtual education. The lecture method, scenario-based interactive education (by dividing students into 5 groups to discuss 5 scenarios), scenarios, and movies were presented in two parts of a workshop in the morning and afternoon. It should be noted that the virtual content (5 videos, 1 text, and 7 short messages related to organ donation) was sent to the student groups A and C via the Telegram social network within 2 weeks (Table 1 and Box 1). The workshop held by the thesis adviser who was an assistant professor in nursing education and the main researcher who was a student of master of sciences. The virtual education was held by the main researcher.

3.8. Ethical Considerations

This study was supported by a research fund from Kurdistan University of Medical Sciences. The protocol of the research project was approved by the Ethics Committee of School of Nursing and Midwifery of Kurdistan University of Medical Sciences No. IR.MUK.REC.1395.200. Ethical considerations in the research included getting permission from the subjects, explaining the objectives and nature of the research, obtaining written consent, persuading the subjects to participate in the research, and assuring

Table 1. Blended Education Plan

Plan	Duration
Workshop	
Clarifying the importance of organ donation and its history	30 min
Review of a short story about organ donation	30 min
Playing a video regarding brain death, the difference between brain death and coma, discussions by the students	30 min
Presenting educational material regarding organ donation (in a lecture format):	1 h
Materials regarding brain death and coma, organ donation card, the effective and determining factors for the waiting time for organ donation, the underlying illnesses that prevent an organ donation, the age of the donors, the appearance of the deceased after the donation of the organ, the opinion of various religions in relation to the organ donation, the costs related to transplantation and removing of organ for donation, tissues which can be donated, materials related to transplant rejection and so on.	
Discussing available scenarios regarding organ donation by the students (in an interactive way)	2 h
Playing a video clip regarding organ donation (to affect the attitude of the students)	30 min
Virtual education	
Virtual education via telegram social network (including sending five videos, one text, and seven texts)	2 weeks

Box 1. A Sample of Scenarios and Messages Sent in the Social Network

Samples
Scenario
A 35-year-old man falls from the third floor and he is admitted to the ICU. After the assessment, the brain death is diagnosed with him. His family after knowing is very agitated and worries about doing organ donation without their permission. What explanation should you give them?
Messages
1. All celeries accepted permission for the organ donation.
2. The heaven reward is an important motive for organ donation.
3. Transplantation of the organs is possible between different sexes and races.

them that obtained information would remain confidential; moreover, it was explained that they could leave the study whenever they wanted to.

3.9. Setting

This study was performed on nursing students of Sanandaj Islamic Azad University. The reason for choosing nursing students is the importance of their future role in the family guidance process for organ donation. In this setting, undergraduate nursing students are educated by providing general and specialized courses for nursing care for children, adults, and elderly during four years. Nursing students start clinical training from the second semester and have to pass the clinical courses simultaneously with theoretical subjects until the sixth semester. The seventh and eighth semester is totally allocated to clinical training. Nursing students take the theoretical subjects, training, and internship courses in various sections of teaching hospitals affiliated to universities. Students, during the years of study, have the opportunity to create a relationship with patients in the various sections, especially intensive care units to achieve experiences. Students' progress in clinical environments is from simple issues toward harder issues.

3.10. Statistics

The collected data were analyzed by SPSS software (version 16) using Fisher, Wilcoxon, Mann-Whitney, and Kruskal-Wallis tests. To compare the variables of gender, religion, ethnicity, marital status, and academic semester between the groups, the Fisher's exact test was used and to compare the age between the groups, the Kruskal-Wallis statistical test was used. The Wilcoxon test was used to compare the awareness and attitude scores before and after the intervention in each group. The Mann-Whitney test was used to compare the awareness and attitude scores between the two groups. The Kruskal-Wallis statistical test was used to compare the awareness and attitude scores between the four groups.

4. Results

The majority of the participants were single (n = 87, 92.55%), Sunni (n = 65, 69%), and Kurdish (n = 87, 92.55%) with an average age of 21.4 $\pm$ 2.04 years. Of them, 58.51% were male and 41.49% were female; 49% of them were in the first semester and 51% were in the second semester. The comparison of demographic characteristics between the

four groups showed that the groups were homogeneous in terms of gender (P = 0.59), religion (P = 0.61), ethnicity (P = 0.11), marital status (P = 0.49), academic semester (P = 0.99), and age (P = 1) (Table 2).

The results showed that the awareness score in group A was 14.62 ± 2.73 before the intervention and 17.33 ± 2.85 after the intervention, which had statistically significant increase (P = 0.004). The awareness score in group B was 14.47 ± 2.29 before the intervention and 15.78 ± 3.27 after the intervention, which increased significantly (P = 0.046). The pre-intervention awareness was not significantly different between the two groups (P = 0.98), indicating that groups A and B were homogeneous before the intervention. The comparison of awareness level in the posttest did not show a statistically significant difference between the two groups A and B (P = 0.06).

The awareness score after the intervention was 18.09 ± 2.24 in group C and 14.8 ± 2.84 in group D, the difference was statistically significant (P = 0.00001) (Table 3). The comparison of awareness after the intervention between group A (17.33 ± 2.85) and group C (18.09 ± 2.24) showed no significant difference (P = 0.52).

The results showed that the attitude score in group A was 42.08 ± 7.27 before the intervention and 47.75 ± 7.73 after the intervention, which increased significantly (P = 0.001). The attitude score in group B was 44.91 ± 7.98 before the intervention and 47.04 ± 9.83 after the intervention, the difference was not statistically significant (P = 0.24). There was no statistically significant difference in terms of attitude before the intervention between the two groups A and B (P = 0.133), indicating that groups A and B were homogeneous. After the intervention, although there was no statistically significant difference (P = 0.898), the mean score of attitude increased. The attitude score after the intervention was 49 ± 4.99 in group C and 43.16 ± 6.20 in group D, the difference was statistically significant (P = 0.0025) (Table 4). The comparison of attitude in the posttest between group A (47.75 ± 7.73) and group C (49 ± 4.99) showed no significant difference (P = 0.72).

The comparison of awareness in the post-test between the four groups showed a statistically significant difference (P = 0.0001). In addition, there was a significant difference in terms of attitudes in the posttest between the four groups (P = 0.0253) (Table 5).

5. Discussion

The findings of this study showed that the level of awareness among nursing students in group A was significantly different before and after the intervention. This also applies to group B. However, the level of awareness before the intervention in groups A and B did not differ with each other statistically. In other words, students' awareness of organ donation was homogeneous in the pretest. Finally, it was found that the level of awareness in the posttest was not significantly different between the two groups A and B, but the score of awareness increased more in group A than in group B. Similarly, the level of awareness among nursing students in group C and group D in the posttest without any intervention was significantly different. The comparison of awareness in the posttest between group A and group C showed no significant difference. The comparison of awareness in the posttest showed a significant difference between the four groups.

The significant difference in the level of awareness before and after the intervention in group A, which received the intervention, indicates the effect of blended education in this study. Moreover, the significant difference of the level of awareness before and after the intervention in group B, which received no intervention, indicates the effect of pretest on awareness. Since there was a possibility that pretest could affect the level of awareness, it was not performed for groups C and D. Thus, the statistically significant difference in the level of awareness after the intervention between the two groups (group C received intervention and group D did not) indicates the effect of the intervention without the impact of the pretest. The insignificant difference between groups A and C in the posttest shows that the pretest had not any effect on the post-test awareness. It means that with the elimination of the pretest effect, the intervention was effective. Overall, the comparison of posttest awareness between the four groups, which showed a statistically significant difference, indicates the effect of the intervention with the elimination of the effect of the pretest. The significant difference between the four groups in the posttest shows the effect of the independent variable (blended education) on dependent variables (awareness and attitude) without the effect of the pretest. This is because the two experimental groups are contrasted and the two control groups are contrasted to verify the difference in the posttest as a result of the pretest. In addition, the after-only groups are contrasted and the before and after groups are contrasted on the dependent variable.

Mahdiyoun et al. by studying the effect of interactive and non-interactive e-learning methods on the awareness of brain death process, organ donation, and satisfaction with education among nurses of the intensive care unit reported that interactive E-Learning could increase the awareness level of nurses of the intensive care unit regarding brain death and organ donation (23). Tikey-Ne et al. also found that blended education could have an impact on the outcomes of students studying public health. Blended education is a goal-oriented convergence between face-to-face education and distance learning, which is purposefully developed by technology and telecommunications. The educational environment requires blended education due to the need for greater flexibility. Many studies

Table 2. Demographic Characteristics of the Groups[a]

Groups	A	B	C	D	P Value
Gender					0.59
Male	16 (66.67)	12 (52.17)	11 (50)	16 (64)	
Female	8 (33.33)	11 (47.83)	11 (50)	9 (36)	
Religion					0.61
Shia	8 (33.33)	6 (26.09)	9 (40.91)	6 (24)	
Sunni	16 (66.67)	17 (73.91)	13 (59.09)	19 (76)	
Ethnicity					0.11
Fars	0	1 (4.35)	0	1 (4)	
Kurd	23 (95.83)	22 (95.65)	21 (95.45)	21 (84)	
Turk	1 (4.17)	0	1 (4.55)	0	
Lurs	0	0	0	3 (12)	
Marital status					0.49
Married	1 (4.17)	1 (4.35)	1 (4.55)	4 (16)	
Single	23 (95.83)	22 (95.65)	21 (95.45)	21 (84)	
Semester					0.99
1st semester	11 (45.83)	11 (47.83)	11 (50)	13 (52)	
2nd semester	13 (54.17)	12 (52.17)	11 (50)	12 (48)	
Age, mean ± SD	20.70 ± 2.52	21.13 ± 1.45	21.27 ± 2.35	22.44 ± 1.29	1

[a] Values are expressed as No. (%) unless otherwise indicated.

Table 3. Comparison of Pretest and Posttest Awareness Within and Between the Groups

Awareness	Pretest	Posttest	P Value[a]
A	14.62 ± 2.73	17.33 ± 2.85	0.004
B	14.47 ± 2.29	15.78 ± 3.27	0.046
P value[b]	0.98	0.06	-
C	-	18.09 ± 2.24	-
D	-	14.08 ± 2.84	-
P value[b]	-	0.00001	-

[a] Within group.
[b] Between groups.

Table 4. Comparison of Pretest and Posttest Attitude Within and Between Groups

Attitude	Pretest	Posttest	P Value[a]
A	42.08 ± 7.27	47.75 ± 7.73	0.001
B	44.91 ± 7.98	47.04 ± 9.83	0.247
P value[b]	0.133	0.898	-
C	-	49 ± 4.99	-
D	-	43.16 ± 6.20	-
P value[b]	-	0.0025	-

[a] Within group.
[b] Between groups.

have shown that blended education has been the most effective educational model and the most popular form of instruction among students (33). Furthermore, in a study by Masoumian Hoseini et al. entitled "the study of the awareness, attitude, and practice of nurses of intensive care units about their role in the donation after brain death, and the factors affecting it", it was found that nursing education could increase their awareness, attitude, and practice re-

Table 5. Comparison of Awareness and Attitude Between the Four Groups in the Posttest

	A	B	C	D	P Value
Awareness	17.33 ± 2.85	15.78 ± 3.27	18.09 ± 2.24	14.08 ± 2.84	0.0001
Attitude	47.75 ± 7.73	47.04 ± 9.83	49 ± 4.99	43.16 ± 6.20	0.0253

garding their role in organ donation (34). The findings of the studies mentioned above are in line with the findings of this study. This consistency in the findings of various studies indicates the importance of awareness in the donation of the organ so that it can be said that as the level of awareness of people improves, the problem of the shortage of donated organs would be solved better and easier. Of course, awareness and information about the issue of organ donation are also very wide. Therefore, the most effective and most important ones that can play a role in increasing the organ donation should be considered. In this regard, brain death should be explicitly explained in order to be understood by the people (35).

One of the findings in this study was that the attitude of nursing students in group A before and after the intervention was significantly different. This does not apply to group B because there was no significant difference. Moreover, it was found that there was no significant difference in attitude before the intervention in both groups A and B. In other words, the nursing students' attitude of organ donation before the intervention was homogeneous. Finally, it was found that the level of awareness after the intervention was not significantly different between the two groups A and B. Last but not the least, the posttest attitude among nursing students in group C and group D without any intervention was significantly different. Moreover, the comparison of the posttest attitude level showed significant differences between the four groups.

The significant difference in the attitude level before and after the intervention in group A, in which the intervention was performed, could indicate the effect of blended education in the present study. In addition, the lack of a significant difference in attitude level before and after the intervention in group B, which received no intervention, could indicate that the pretest had no effect on attitude. Considering the fact that pretest could affect the attitude level, no pretest was done in groups C and D. However, the significant difference in the post-intervention attitude level between both groups (group C received intervention and group D received no intervention) could indicate the effect of the intervention without the impact of the pretest. The insignificant difference between group A and group C in the posttest shows that the pretest had no effect on posttest attitude. It means that with the elimination of the pretest effect, the intervention was effective. Overall, the comparison of post-intervention attitude between the four groups, which showed statistically significant differences, indicated the effect of the intervention with the elimination of the effect of the pretest.

Abbasi et al. in a study on the effect of education regarding brain death and organ donation on the attitude and awareness among nursing students reported that education related to brain death increased the attitude and awareness of organ donation. Accordingly, attitude should be emphasized because part of the nursing students' attitude toward organ donation is explained by increasing their attitude (28). In another study, carried out by Azmandian et al. in 2013 on 120 nurses of the intensive care unit and emergency department of Kerman hospitals who participated in a brain death seminar, it was found that nurses' attitude increased after the seminar (24). The findings of these studies are in agreement with the findings of this study. One of the possible reasons for the consistency of the results can be the importance of the attitude towards organ donation, which is the most important and effective factor for the explanation of this issue. This is because the attitude toward organ donation includes a set of beliefs of the personality system toward the subject and this attitude is prior to the act of donation. Thus, the type of attitude (positive or negative) can be a determinant of the quality and quantity of the mentioned reaction (35).

5.1. Limitations and Suggestions

Awareness, attitude, and willingness to donate are parts of the concept that may be affected by many factors and this study attempted to investigate them. However, there may be factors beyond the discretion of the researcher. Considering the effect of pretest and familiarity of the subjects with the questions on the posttest results, a four-group Solomon design was used to resolve the pretest effect. In addition, we asked the students of the intervention groups not to share the information they earned in the workshop and virtual education with the students of the control groups. However, it was beyond the control of the researcher at intervals of the intervention. In this study, the awareness and attitude of nursing students were investigated. Due to the short duration of the study, their practice, i.e. trying to have a donation card or being willing to receive the card, was not investigated. Therefore, it is suggested that the effect of interventions on students' practice regarding organ donation is investigated. This study was conducted on nursing students. Therefore, it is suggested carrying out some other studies on students of other fields. In addition, blended education

can be compared with other educational methods regarding organ donation. The implementation of community education programs for all people in the community is recommended to strengthen the awareness and attitude towards organ donation and to create proper culture. It is also suggested that organ transplantation and organ donation are placed among the priorities of the relevant authorities, including the Ministry of Health, the Medical Board, the Forensic Medicine Organization, and the broadcasting organizations.

5.2. Conclusions

The results of this study showed that blended education could increase the awareness and attitude of nursing students toward organ donation. Therefore, this method can be used in nursing education and nursing curriculums.

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Footnotes

Authors' Contribution: Shoaib Dehghani: Participated in research design, participated in the writing of the paper, participated in the performance of the research, contributed new reagents or analytic tools, participated in data analysis and participate in article writing. Kaveh Bahmanpour: Participated in research design, participated in the writing of the paper, contributed new reagents or analytic tools, participated in data analysis and participate in article writing. Bijan Nouri: Participated in data analysis. Sina Valiee: Participated in research design, participated in the writing of the paper, contributed new reagents or analytic tools, participated in data analysis and participate in article writing.

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Correlation of Motivational Beliefs and Cognitive and Metacognitive Strategies with Academic Achievement of Students of Shiraz University of Medical Sciences

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Abstract

Background: Success and academic achievement are among the most important goals of both students and educational systems. Researchers have examined the impact of different factors such as intelligence, personality, attitude, study habits, thinking skills and academic motivation on students' academic performance.

Objectives: The purpose of this study was to investigate the relationship of motivational beliefs and cognitive and metacognitive strategies with students' academic achievement.

Methods: In this descriptive - analytic cross-sectional study, the statistical population included all medical and health students of Shiraz University of Medical Sciences (1405 students), 250 of whom were selected according to the Levy and Lemeshow's formula. After estimating the sample size, the stratified random sampling method was used. To collect data, Pintrich and de Groot's motivated strategies for learning questionnaire (MSLQ) was employed. Data were analyzed using descriptive statistics, Pearson's correlation and independent *t*-test.

Results: Among the components of cognitive learning strategies, comprehension ($r = 0.1266$, $P < 0.10$), and among the components of metacognitive learning strategies, the regulation component ($r = 0.049$, $P < 0.05$) had a significant positive correlation with academic performance. Among the components of motivational beliefs, the self-efficacy component ($r = 0.173$, $P < 0.10$) showed a significant positive correlation with academic performance. Based on the results of multiple regression analysis, only metacognitive learning strategies had the ability to predict the academic performance of the students. There was no significant difference between male and female students in any of the studied variables.

Conclusions: Based on the results, students who use more diverse cognitive strategies show better performance than others. Performance is more desirable among those who evaluate their understanding of the content of the course and make more efforts and have more perseverance (regulation) in the learning process. Students who believe in their abilities (self-efficacy) and reinforce these beliefs will have a better academic performance.

Keywords: Learning Strategies, Cognitive, Metacognitive, Academic Achievement, Students

1. Background

Today, success and academic achievement are among the most important goals of both students and educational systems, because the success of students plays an important role in acquiring job opportunities and creating a desirable life, it also reflects the effectiveness and efficiency of educational systems. Therefore, better understanding of individual factors influencing students' academic achievement has always been one of the main concerns in the field of learning psychology (1) and one of the challenges faced by teachers in the higher health education system (2).

Accordingly, many studies have examined the factors affecting the academic achievement of students and have examined the impact of different variables such as intelligence, personality, attitude, study habits, thinking skills, competence and academic motivation on learner's academic performance (3-10). In this regard, researchers have pointed to self-regulated learning strategies in their efforts to explain the factors affecting performance and academic achievement (11).

Self-regulated learning is defined as the ability of students to take responsibility and manage their learning processes. Therefore, self-regulated learning involves equipping or mobilizing cognitive, metacognitive, emotional and motivational resources of students (12). Accordingly, researchers regard self-regulated learning as a multidimensional construct that emphasizes on learners' active role (13). Therefore, focusing on self-regulated learning strategies (cognitive, metacognitive and motivational) of learners has led to the introduction and presentation of different models and patterns of these strategies. Although all these models offer different perspectives on self-regulated learning, they all consider self-regulating learners as actively involved in building knowledge and using diverse cognitive and metacognitive strategies to manage and regulate their learning (14).

One of the most widely used theories in this field is Pintrich's self-regulated learning theory. Pintrich and de Groot defined self-regulated learning, in which the learner regulates and controls his/her learning goals, cognition, motivation and behaviors (11). In fact, Pintrich et al. (1995) argued that by considering motivational components along with cognitive components, learner's learning and performance can be explained more realistically. Similarly, they referred to the three components of cognitive strategies, metacognitive strategies and motivational beliefs (15).

Cognitive strategies are those strategies that are directly related to information processing and can be used to acquire, store and use information better. In contrast, metacognitive strategies are methods used by individuals to plan, monitor and regulate learning (13). Pintrich and de Groot proposed that motivational beliefs include self-efficacy, intrinsic value and test anxiety (11).

Learning strategies play an important role in the acquisition, storage and use of knowledge (16). Also, they play a facilitating role in learners' learning process (17). Accordingly, students who use more diverse strategies can achieve better learning and higher academic performance than their peers who do not have the skills to use these strategies (7, 8, 12, 13). Studies in this field have confirmed the effectiveness of these strategies and have shown their positive relationship with learners' performance and academic achievement (12, 18-21).

The results of some studies suggest that self-regulated learning strategies can predict academic performance (21, 22), because students who use self-regulation in their learning process are more focused on their own performance and have a sense of competence and ability to fulfill tasks. Not only are these students more motivated, but they also have more self-control behaviors and educational ambitions. In contrast, students who do not have sufficient experience in the self-regulation process have a lower sense of competence and self-efficacy and higher levels of anxiety. Also, they avoid learning opportunities ahead of them (23).

Regarding the importance of self-regulated learning strategies in the learning process, several studies have examined these strategies. Generally, previous studies were mainly focused on motivational-cognitive constructs such as epistemological beliefs (24), self-efficacy beliefs (25), academic emotions (17, 26), progress goals (2) and assignment value (27), but in the context of the consequences of self-regulated learning strategies, research is limited, especially in higher education in health and medical sciences. On the other hand, most studies have been conducted in Western countries (2, 11, 12, 28), and the extrapolation of these results to other countries, especially developing countries, has been criticized (29). Therefore, this study was conducted to investigate the effect of self-regulated learning strategies (cognitive and meta-cognitive strategies) and motivational beliefs on academic performance of medical and health students of Shiraz University of Medical Sciences in 2017 - 2018.

2. Objectives

Therefore, this study was conducted to investigate the effect of self-regulated learning strategies (cognitive and meta-cognitive strategies) and motivational beliefs on academic performance of medical and health students of Shiraz University of Medical Sciences in 2017 - 2018.

3. Methods

This was an applied cross-sectional (descriptive - analytical) study. The statistical population of the study included all the health and medical students of Shiraz University of Medical Sciences. According to the obtained data and Levy and Lemeshow's formula, 250 students were selected (30). This formula is one of the sampling formulas that is widely used in human and behavioral sciences research (30) and is presented in Equation 1, where n is sample size, N denotes population size, S_x shows standard deviation, ε signifies error coefficient, V_x is coefficient of variation and Z is the level of confidence.

$$n \geq \frac{Z^2 N V_X^2}{(N-1)\varepsilon^2 + Z^2 V_X^2}\ ,\ V_X = \frac{S_X}{\bar{X}} \quad (1)$$

It should be noted that the motivated strategies for learning questionnaire was first piloted among a sample of 40 students and the standard deviation and mean were calculated and then placed in the formula. After estimating the sample size, the stratified random sampling

method was used. According to the size of the statistical population, which included 625 medical students and 780 health students, the proportional sample was estimated for each stratum, and accordingly, 113 medical students and 137 health students were randomly selected. To collect data, the Pintrich and de Groot's motivated strategies for learning questionnaire (MSLQ) was used.

This questionnaire includes 47 items and two subscales of motivational beliefs (25 items) and self-regulated learning strategies (22 items) that are rated using a 5-point Likert scale (1 = completely disagree to 5 = strongly agree). The motivational beliefs subscale is comprised of the three components of self-efficacy, intrinsic value and test anxiety, and the self-regulated learning subscale is composed of the two components of cognitive and metacognitive strategies (11). Pintrich and de Groot confirmed the validity and reliability of the MSLQ using factor analysis and Cronbach's alpha coefficient, respectively (11). Studies in Iran have also reported acceptable psychometric indices for MSLQ (31).

In the present study, Cronbach's alpha coefficient was used for reliability analysis and the obtained value (0.84) indicated desirable reliability of this tool. The face and content validity of the questionnaire was confirmed by experts and faculty members. It should be noted that in the present study, the students' grade point average (GPA) was considered as the index of academic performance. This research was approved by the Deputy of Research of Shiraz University of Medical Sciences and registered at the University's Ethics Committee (No. 15677). Also, the confidentiality criteria were met and the participants were assured that the data will be analyzed without indicating the name of the participants.

4. Results

Based on the descriptive findings, 68.6% (162 cases) of the samples were female students and 31.4% (74 men) were male students. In terms of field and educational level, 55% (130 people) were students of health and 45% (106) were medical students. Of the medical students, 13.1% (31 persons) were studying basic sciences, 7.2% (17 subjects) were studying physiopathology, 5.9% (14 persons) were externs and 18.64% (44 persons) were interns. The mean age of the medical and health sciences students was 26.46 and 24.96 years, respectively.

As shown in Table 1, the correlation coefficient between cognitive learning strategies and academic performance was 0.110, but this relationship was not significant (P = 0.94). Also, among the components of cognitive learning strategies, only the component of comprehension with a correlation coefficient of 0.266 showed a significant and weak correlation with academic performance ($P \leq 0.01$).

Table 1. Correlation of Self-Regulated Learning Strategies (Cognitive and Metacognitive Strategies) and Motivational Beliefs with Academic Performance of the Students

Independent Variables	Academic Performance	
	Correlation Coefficient	P Value
Cognitive learning strategies	0.110	0.094
Rehearsal strategies	0.086	0.192
Elaboration	0.103	0.117
Summarizing	0.081	0.217
Organizational strategies	0.025	0.705
Comprehension	0.216	0.001
Metacognitive strategies	0.181	0.005
Planning	0.096	0.143
Monitoring and control	0.112	0.087
Regulating (effort and perseverance)	0.149	0.023
Arrangement activity	0.120	0.069
Motivational beliefs	0.047	0.472
Self-efficacy	0.173	0.008
Goal orientation	0.060	0.360
Intrinsic value	0.017	0.796
Test anxiety	0.090	0.172

Other findings indicated that there was a significant and weak correlation between meta-cognitive learning strategies and academic performance ($P \leq 0.01$, r = 0.186), which means that as metacognitive learning strategies are reinforced in students, their academic performance will improve more and vice versa. Also, in examining the dimensions of metacognitive learning strategies, the findings showed that only the regulation component (effort and perseverance) had a significant and weak correlation with academic performance ($P \leq 0.023$, r = 0.149), but there was no significant relationship between other dimensions and academic performance.

Finally, the findings showed that there was no significant positive correlation between motivational beliefs and academic performance (P = 0.472). However, among the components of motivational beliefs, only the self-efficacy component had a significant and weak correlation with academic performance of students ($P \leq 0.01$, r = 0.173), and other dimensions did not show any significant relationship with academic performance.

In order to predict academic performance of the students based on the variables of learning strategies and motivational beliefs, multiple regression analysis was used, the results of which are presented in Table 2.

The results of multiple regression analysis showed that among the predictive variables, only the metacognitive

Table 2. The Prediction of Academic Performance Based on Learning Strategies and Motivational Beliefs Using Multiple Linear Regression

Model	β	Beta	Error	R	R^2	*t*	P Value
Constant value	14.780	-	0.876	0.183	0.033	16.880	< 0.001
Cognitive learning	0.070	0.028	0.201			0.347	0.729
Metacognitive learning	0.436	0.171	0.193			2.250	0.025
Motivational beliefs	-0.045	-0.014	0.226			-0.200	0.842

learning strategies variable had a significant predictive power for the students' academic performance criterion (P = 0.025) and the other predictive variables did not have a significant contribution to the prediction of academic performance.

Independent *t*-test was used to examine gender differences in the use of cognitive and metacognitive strategies and to evaluate the difference in motivational beliefs, the results of which are demonstrated in Table 3.

Independent *t*-test results reflected no significant difference between male and female students regarding cognitive and metacognitive strategies or motivational beliefs.

Pearson correlation test was used to examine the relationship between age and the use of learning strategies and motivational beliefs in students, the results of which are displayed in Table 4.

According to Table 4, there was a significant and weak correlation between students' age and cognitive strategies (r = 0.289), metacognitive strategies (r = 0.195), motivational beliefs (r = 0.139) and goal orientation (r = 0.158).

5. Discussion

The results of this study showed a positive, but non-significant, relationship between cognitive learning strategies and academic performance, which was consistent with the results of Colorado (32) and Valkyrie (33) studies. In their studies, no significant relationship between cognitive learning strategies and academic performance was reported (32, 33). In this regard, some researchers believe that cognitive learning strategies are more commonly used by ordinary students, while intelligent and high-performing students often use metacognitive learning strategies (34).

Also, since cognitive learning strategies are superficial strategies for learning (for example, the strategy of recitation and review that is superficial and shallow), it can be expected that the use of these strategies does not make any significant difference in students' learning and performance. On the other hand, Zimmerman et al. in their research argued that students who use more diverse cognitive strategies show better learning and higher academic performance. Also, learning outcomes are more positive in these students than their peers who do not have the skills to use these strategies (12). Therefore, it can be stated that the lack of sufficiently diversified cognitive strategies causes these strategies not to be significantly effective on performance.

Other results of the present study showed that among the components of cognitive learning strategies, only the component of comprehension had a significant positive correlation with academic performance of students. Strategies such as reading comprehension, help students remember contents in a more consistent and organized manner and have a satisfactory performance in their exams. Students who evaluate their understanding of the content in the learning process and use this strategy to self-assess can improve their performance since if they have a problem in comprehension, they still have the opportunity for reviewing and learning both in the classroom and outside the educational environment, and these students through rumination of contents enhance their learning and performance.

Based on the results of the present study, there was a significant positive correlation between meta-cognitive learning strategies and academic performance; it means that as the metacognitive learning strategies are strengthened in students, their academic performance improves as well. This finding is consistent with the results of numerous studies that have shown metacognitive learning strategies are among the most important predictors of students' academic achievement (1, 12, 28, 35-38). Accordingly, it can be admitted that students who use metacognitive strategies more effectively, have better planning for their studies, more effective evaluation and monitoring of their learning and greater understanding of the subject. Accepting the responsibility of their work, these students discover and solve their learning problems. Therefore, it is reasonable that these people gain more academic achievements compared to peers who do not have the skills to use these strategies (12, 39, 40).

In other words, metacognition is a tool that not only involves students in the process of learning, but also grants their learning responsibility to themselves (41). In fact, more engagement of students in the learning process

Table 3. Comparison of Learning Strategies and Students' Motivational Beliefs Based on Gender

Variable	Sample Size	Mean ± SD	*t*	P Value
Motivational beliefs			-1.782	0.076
Male	73	0.417 ± 3.580		
Female	162	0.441 ± 3.690		
Cognitive learning strategies			0.006	0.995
Male	73	0.593 ± 3.880		
Female	162	3.880 ± 0.515		
Metacognitive learning strategies			-1.600	0.110
Male	73	0.453 ± 3.500		
Female	162	0.572 ± 3.620		

Table 4. The Relationship Between Age and Learning Strategies and Motivational Beliefs in Students

Variables	Mean ± SD	Correlation Coefficient with the Age Variable	P Value
Cognitive strategies	3.880 ± 0.537	0.298	< 0.001
Metacognitive strategies	3.580 ± 0.535	0.195	0.003
Motivational beliefs	3.650 ± 0.434	0.139	0.032
Self-efficacy	3.960 ± 0.561	0.127	0.051
Goal orientation	4.000 ± 0.569	0.158	0.015
Intrinsic value	3.870 ± 0.601	0.100	0.123
Text anxiety	2.870 ± 0.917	0.029	0.660

leads to their active encounter with the materials and course contents, which in turn can affect their learning and performance. In addition, metacognition is a factor that allows students to manage their learning and performance through managing thoughts, evaluating learning and appraising the time needed for study.

In examining the dimensions of metacognitive learning strategies, the results indicated a significant positive correlation between the regulation component (effort and perseverance) and the academic performance of the students, which was similar to the findings of Farhadinia et al. (31). Pintrich and de Groot believe that not only students should know what cognitive learning strategies they should use, but they also need to know how and when to use them (metacognition) (11). Therefore, it can be argued that students who are able to manage and regulate their efforts to better understand and learn naturally show superior learning and performance (11).

Other results indicated that among motivational beliefs components, self-efficacy had a significant positive correlation with academic performance of students. This finding was supported by the results of Alyami et al. (42), Zajacova et al. (43), Domenech-Betoret et al. (44), Villavicencio and Bernardo (45), Sadi and Uyar (46), Diseth (47), Komarraju and Nadler (48) and Lee et al. (49). Therefore, it seems that self-efficacy can be one of the most important factors in student's academic achievement. In a study by Chemers et al., it was found that students' self-efficacy level in their freshman year was a powerful predictor of their future academic performance. In other words, students who enter the university with high academic self-efficacy show a significantly better performance (50).

Academic self-efficacy refers to learners' beliefs in relation to their academic performance and is defined as the belief that they can successfully fulfill academic tasks and learn contents (51-53). Self-efficacy beliefs increase performance through increased commitment, effort and perseverance (54, 55). Researchers believe that learners with high self-efficacy generally attribute their failures to less effort than ability. In contrast, learners with low self-efficacy attribute failures to their lower ability (56). For this reason, self-efficacy can influence the choice of assignments and perseverance in doing them (57).

Students with low self-efficacy beliefs are more likely to be afraid of accepting and performing tasks, postpone tasks and give up very soon (53, 54, 58). In contrast, students with high self-efficacy are more likely to find themselves suited to deal with complex problems. In the process of problem-solving, they are patient and show more effort and perseverance to overcome challenges (46, 52, 54).

Also, people with high self-efficacy consider tasks as challenges that they need to master, believe themselves more, show more effort and perseverance, use cognitive and meta-cognitive learning strategies better, are superior in memorizing and remembering and have better performance in doing assignments (59, 60), which is why they show higher performance as compared to others.

The results of this study showed no significant difference between male and female students in any of the variables of self-regulated learning strategies (cognitive and meta-cognitive) and motivational beliefs. This finding was congruent with the results of Anderman and Young (61) and Linn and Hyde (62). However, this finding was not in line with results of Zimmerman and Martinez-Pons, who concluded that girls were significantly more concerned with recording, self-monitoring and organizing the study environment than boys (63). Peklaj and Pecjak also found that girls in all the four components of self-regulated learning strategies (recitation, elaboration, organization and metacognitive strategies) were significantly different than boys and used these strategies more (64).

The results of this study showed a significant positive correlation between age and self-regulated learning strategies (cognitive and metacognitive). Accordingly, it can be stated that with increasing age and consequently, increasing academic years and gaining experience in dealing with academic and learning situations, students are more likely to become proficient in using learning strategies, that is, with increasing academic years, they can use more effective strategies to understand and learn lessons. Acquiring experience during study years helps students to use cognitive and metacognitive learning strategies.

5.1. Conclusion

Based on the results of this study, the learning strategies of comprehension and regulation (effort) have a positive correlation with academic performance. In fact, teaching and learning the above strategies can improve students' performance. Also, the results of this study showed that students who believe in their abilities (self-efficacy) show better performance. Therefore, medical professors can minimize students' stress by creating a supportive and peaceful environment, because stressful and competitive situations can affect individuals' self-efficacy. Also, professors can boost their students' self-efficacy through providing positive and supportive feedback.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

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Influence of Flipped Classroom Method on Nursing Students' Learning Approaches

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Abstract

Background: Active learning approaches, including the flipped classroom, can enhance meaningful learning among students of medical sciences.
Objectives: The purpose of this study was to investigate the effect of the flipped classroom teaching method on nursing students' learning approaches.
Methods: This one-group quasi-experimental study with a pretest-posttest design was carried out among 46 undergraduate nursing students who had passed the orthopedic nursing course in the academic year of 2017-2018. The participants were selected by the census method. To teach through the flipped classroom method, the instructor provided electronic content for the course using the Articulate Storyline software. Students studied electronic contents and the reference book prior to each session and participated in predetermined collaborative activities. Data were collected using the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) before and after the completion of the classes. Data were analyzed using descriptive statistics, independent *t* test, paired *t* test and Pearson correlation coefficient by SPSS software.
Results: The flipped classroom method significantly increased the deep learning approach ($P < 0.001$) and its subscales including deep motive ($P < 0.001$) and deep strategy ($P = 0.001$). Also, there was a significant negative correlation between deep learning and superficial learning before ($r = -0.29$, $P = 0.047$) and after ($r = -0.34$, $P = 0.015$) the implementation of the flipped classroom method.
Conclusions: By implementing the flipped classroom method, deep learning among nursing students is strengthened. Also, by assessing learners' study approaches, it is possible to identify the various educational methods that affect deep learning.

Keywords: Deep Learning, Active Learning, Nursing Education

1. Background

The goal of nursing education is to prepare students for safe nursing practice. To provide safe care for patients with complex health needs, students must have a strong knowledge base, critical thinking ability, judgment and clinical reasoning ability, and problem-solving and decision-making skills in providing care (1). Nursing instructors can provide the conditions for developing these skills as well as professional development and deep learning opportunities for students by employing active approaches to classroom and clinical settings (2, 3). Traditionally, nursing education has been based on a behavioral model that has not resulted in improved educational performance (4). It is a teacher-centered approach and results in superficial learning. The outcome of such training is students who merely memorize the information for a short while and are unable to integrate new information with their basic knowledge (5).

Learner-centered approaches include active learning methods, which often lead to deep learning, that is, long-term retention of data and the ability to apply them. In contrast, in traditional teacher-centered classrooms, the instructor passes the content through lectures to passive learners and fosters superficial learning (6). One of the most comprehensive approaches that has been taken into account in nursing education in recent years is the flipped classroom approach (7), that is, the reversal of the classroom to replace traditional teaching methods with collaborative and interactive activities (8). In this method students learn the content prior to attending the class, and the class time is spent on exercises and the use of the lessons learned (9). The results of studies on the use of flipped classroom in the field of nursing education have shown that learners are satisfied with this educational method (10), and clinical decision making (11), orientation

(12), and critical thinking skills (13) are strengthened in this method.

Instructors provide the conditions for deep and meaningful learning through educational methods that enable learners to work and think at different cognitive levels (14). Ausubel et al. (15) and Cavallo et al. (16) defined meaningful learning as the process of making connections between the newly learned concepts and the previously learned ones and emphasized on appropriate learning environment for deep and meaningful learning. In meaningful learning, often associated with deep learning, knowledge is achieved through the linking of new concepts with prior knowledge and the establishment of relationships between concepts, while in superficial learning, content is solely stored, and no connection is established between concepts (17). Different studies in the field of nursing have concluded that deep and meaningful learning leads to high levels of thinking about nursing knowledge and clinical skills of patient care (14, 18). One of the indicators of meaningful learning is the learning approaches adopted by learners (17, 19).

Biggs et al., for the first time, defined learning approaches as a way of performing academic assignments that influence the nature of learning outcomes. They described the learning process as a predictive process model. There are predisposing factors before the learning situation, which are indicative of individual factors such as personality, attitude, prior knowledge, and preferential learning styles as well as situational factors such as the context of education, including content, teaching methods and processes, and institutional assessment (20). Most studies on learning approaches are derived from the study by Marton and Säljö (21). They found that some learners have intrinsic motivation and try to understand the meaning of the content being studied and link it to their schemata and called it deep approach (21). In a superficial approach, learners mostly tend to have a superficial learning style and only attempt to memorize the materials they think they would need in evaluations (4, 22). Subsequent studies showed that the deep learning approach compared to the superficial approach leads to the promotion of academic success and is an important factor in the quality of learning (23).

2. Objectives

Considering that the dominant teaching methods in medical sciences are traditional methods that preclude the integration of newly acquired materials with basic knowledge and their application and given the importance of enhancing deep learning in medical sciences education using learner-centered approaches, we sought to investigate the effect of the flipped classroom teaching method on nursing students' learning approaches.

3. Methods

This was a one-group semi-experimental study with a pretest-posttest design. All the 49 undergraduate nursing students who had completed the orthopedic nursing unit in the academic year of 2017 - 2018 were invited to participate in the study. The participants were chosen through the census method. The students were ensured of the voluntary nature of participation in the study. Also, they were informed of their rights as participants in the study. Those who were willing to participate completed the informed consent form. The present study was approved by the Ethics Committee of Islamic Azad University of Rasht (code: IR.IAU.RASHT.REC.1395.8).

The inclusion criteria included completion of the theoretical unit of orthopedic nursing, access to a computer, and willingness to participate in the study. Absence of more than one session from the class, lack of willingness to continue cooperation, and incomplete completion of the questionnaire were considered as the exclusion criteria. Of the 49 distributed questionnaires, three were incomplete; thus, 46 were analyzed.

To implement the flipped classroom method, the instructor recorded all the orthopedic nursing lesson lectures in the traditional classroom method before the outset of the course. Then, an expert in e-learning, using the Articulate Storyline software and slides and videos provided by the instructor, prepared electronic content for seven sessions. The entire electronic content was copied to a compact disc and distributed among the students a week before the classes began.

Based on the lesson plan, students knew what content and what pages of the reference book should be studied before each session. In this way, the students attended each session with prior preparedness. In each session, the instructor first gave a brief lecture on the learning objectives of the session, and then the students responded to quiz questions. The teacher then divided the students into small groups of 3 - 4. The learners' activities in small groups included discussion and comparison, answers to quiz questions, and clinical scenarios. Before each session, the lecturer, in accordance with the concepts of each session, designed clinical scenarios with the aim of applying theoretical knowledge in clinical situations, and the students were asked, after thinking and sharing in the group, to answer the clinical scenario questions and then have a discussion with the professor and other students. The course lasted for eight weeks.

A two-part questionnaire was used to collect data. The first section included demographic information such as age, gender, marital status and employment status, and personal data included grade point average, and orthopedic nursing course grade point. The second section was the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) that was used to evaluate students' learning approaches (20). The questionnaire was based on the studies by Marton and Säljö (21) and Biggs (24).

R-SPQ-2F consists of 20 items and two sub-scales of deep approach and superficial approach, each of which comprises 10 items rated based on a five-point Likert scale (i.e., never applies to me = 1 to it is always the case for me = 5). The sub-scale scores are summed up separately and the minimum and maximum scores of each approach are considered to be 10 and 50, respectively. Each of the superficial and deep approaches consists of two subscales of motive and strategy. Biggs et al. established the reliability of this tool using the Cronbach's alpha coefficient for the deep approach (alpha: 0.73) and the superficial approach (alpha: 0.64) (20). The scale has been used in various international studies to evaluate meaningful learning and learning approaches in nursing students (4, 25, 26).

The R-SPQ-2F questionnaire was previously translated into Persian (27). Prior to the study, Cronbach's alpha coefficient was used to calculate the reliability of the instrument. The questionnaire was filled out by 30 nursing students of Islamic Azad University of Rasht who were randomly selected. The reliability of the tool in the subscale of the superficial approach was 0.75, and in the subscale of deep approach it was 0.64. To collect the data in the first session and at the end of the final session, samples were asked to write a four-digit code based on the day and month of their birth on their questionnaires and then complete the questionnaires based on their study approach.

To investigate the distribution of research variables, Kolmogorov-Smirnov test was used, which indicated the normal distribution of the variables and therefore, parametric statistics were used for analysis. Frequency, percentage, mean and standard deviation were applied for analyzing demographic information and learning approaches. Paired *t* test was run to investigate the effect of the flipped classroom method on learning approaches, Pearson correlation coefficient to examine the relationship between deep and superficial learning, and independent *t* test to investigate the relationship demographic variables and students' learning approaches. Finally, the data were analyzed using SPSS version 20 (version 20, IBM Corporation, Armonk, NY).

4. Results

Of the 49 students, 46 completed the questionnaire before and after implementing the flipped classroom method. Three students were excluded from the study due to incomplete questionnaires. Thus, the response rate was 96.5%. Of the 46 participants, 69.6% were female, 89.1% were within the age group of 18 - 22 years, 93.5% were single, and 87.0% were not employed. The mean grade point average (GPA) of the previous semester and the mean orthopedic nursing grade point of the samples were 15.27 ± 1.31 and 15.45 ± 14.2, respectively.

Paired *t* test was used to examine the effect of flipped classroom method on students' learning approaches (Table 1). The results of the data analysis showed that the flipped classroom method significantly increased the deep learning approach ($P < 0.001$) and its subscales including deep motive ($P < 0.001$) and deep strategy ($P = 0.001$). Although the scores of superficial learning and the subscales of superficial motive and superficial strategy increased, this difference was not statistically significant. To investigate the relationship between deep learning and superficial learning, Pearson correlation coefficient was used. According to this, there was a significant negative correlation between the two variables before ($r = -0.29$, $P = 0.047$) and after ($r = -0.34$, $P = 0.015$) the implementation of the flipped classroom method.

Table 1. Comparison of Nursing Students' Learning Approaches Before and After Implementing the Flipped Classroom Method[a]

Learning Approach	Before	After	P Value
Deep motive	15.13 ± 3.28	18.22 ± 2.92	< 0.001
Deep strategy	13.83 ± 3.22	15.96 ± 2.89	0.001
Superficial motive	11.02 ± 3.22	11.04 ± 4.52	0.977
Superficial strategy	12.24 ± 3.52	12.93 ± 3.82	0.289
Deep approach	28.96 ± 5.70	34.17 ± 4.90	< 0.001
Superficial approach	23.26 ± 5.99	23.98 ± 7.46	0.564

[a] Values are expressed as mean ± SD.

The previous semester GPA and the orthopedic course grade point showed a significant relationship with the learning approach. Based on Table 2, the previous semester GPA of the students who had a deep learning approach had a significant positive correlation with the learning approach before and after the implementation of the flipped classroom method, that is, students who had a higher GPA used the deep learning approach both before and after the implementation of the flipped classroom method. In addition, the orthopedic nursing grade point was poorly associated with the deep learning approach after the implementation of the flipped classroom method.

Table 2. Relationship Between Nursing Students' Learning Approaches Before and After Implementing the Flipped Classroom Method with the Previous Semester Grade Point Average and Orthopedic Nursing Course Grade Point

Learning Approach	Before		After	
	Correlation Coefficient	P Value	Correlation Coefficient	P Value
Deep approach				
Previous semester GPA[a]	0.504	< 0.001	0.300	0.042
Orthopedic nursing GP[b]	0.208	0.166	0.369	0.012
Superficial approach				
Previous semester GPA	0.037	0.809	0.128	0.397
Orthopedic nursing GP	0.046	0.762	0.258	0.084

[a] GPA: Grade point average
[b] GP: Orthopedic nursing grade point

5. Discussion

The purpose of this study was to investigate the effect of flipped classroom method on nursing students' learning approaches. The results showed that the flipped classroom method significantly increased the deep approach and its subscales, including deep motive and deep strategy, while not affecting the superficial approach and its sub-scales. In this regard, McLaughlin et al., who used the flipped classroom approach among pharmacology students in their research, found that flipped classroom could promote classroom attendance and learning. They concluded that meaningful learning is a shared responsibility of the instructor and learner and can be boosted through learner-centered methods such as flipped classroom (28).

Hanson also used the flipped classroom method to teach nursing students pharmacology lessons and concluded that students who had viewed recorded lectures before attending the class had a better perception of the teaching concepts (13). Also, Raihanah studied the impact of the flipped classroom teaching method on literature students' learning and found that flipped classroom leads to higher learner ability and flexibility in learning participation (29). This finding could be manifold. The flipped classroom method with emphasis on active learning and learner-centeredness (30) and the use of class time on the application of the learned concepts allows for deep learning (31). In this approach, the leaner is expected to prepare a great volume of assignments before attending the classroom in order to achieve the desired learning outcomes; in many studies, the compulsion to study lengthy electronic contents and reference books caused students' dissatisfaction (10, 32). It has been shown that heavy academic workload and tasks affect the depth of students' studies, and this suggests that the prerequisite for optimal studying and learning is reasonable amount of assignments and that too few tasks and assignments do not affect students' learning (26).

One of the reasons why students use the superficial approach and try to memorize content without deep learning is that they study according to the needs of the course. If students perceive that the lesson requires superficial studies, they will adopt a superficial approach, while if the lesson's assignments require deep learning, they will engage in complex cognitive activities and relate concepts to their prior knowledge (33), as the flipped classroom teaching method in this unit, which helped deepen the learning of learners. The results of this study showed that the flipped classroom method does not affect superficial learning. The superficial learning approach is considered as an unsuccessful approach in higher education, since the learner only tries to memorize information to pass the final exam, while the newly learned materials are not connected to the previous ones (4).

The result of Pearson correlation test reflected a significant negative correlation between deep learning and superficial learning before and after implementing the flipped classroom method. Henoch et al. also used the R-SPQ-2F questionnaire among nursing students and reported a weak significant negative correlation between deep and superficial learning (25). Gurcay also found a significant negative correlation between deep learning and superficial learning (17). In interpreting this finding, it can be noted that with the increasing desire of nursing students to learn by linking concepts with prior knowledge, their tendency toward superficial learning, that is memorizing and storing concepts without making any connections, will be reduced (31).

Based on the results of this study, students with a higher GPA in the previous semester used a deep learning approach both before and after the implementation of the flipped classroom method. In addition, there was a significant correlation between orthopedic nursing grade point

and the deep learning approach after the flipped classroom method was implemented. In the study by Rosander and Bäckström, there was also a weak positive correlation between deep learning and the mean academic scores of students (34). In a prospective study among nursing students, Salamonson et al. found that deep learning predicts students' scores in the university, and such students use adaptive skills as self-regulation strategies in learning (35). In other words, deep learning is associated with better student scores and academic success.

5.1. Conclusions

The results of this study showed that by implementing the flipped classroom teaching method the deep learning approach is boosted among nursing students. Also, students who studied with a deep approach had better academic outcomes. Hence, the flipped classroom method can be used to promote learning among medical sciences students. This educational method has the potential of equipping learners to work in complex therapeutic environments. This quasi-experimental study was performed in the absence of a control group; thus, we suggest further evaluations of the effects of the flipped classroom method on learning approaches of students using experimental studies with a control group. By assessing the learning approaches of students, it is possible to identify new educational methods that are effective in deep learning.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: There is no conflict of interests.

Ethical Considerations: The students were ensured of the voluntary nature of participation in the study. Also, they were informed of their rights as participants in the study. Those who were willing to participate completed the informed consent form. The present study was approved by the Ethics Committee of Islamic Azad University of Rasht (code: IR.IAU.RASHT.REC.1395.8).

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Oral Presentation Versus Role Playing in Medical Education: A Quasi-Experimental Study

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Abstract

Background: It is claimed that role-playing is a teaching strategy that has several advantages for both the teacher and student. This study aimed to compare two educational methods (oral presentation, a traditional method that is known to be teacher-centered, versus role-playing which is a student-centered method).

Methods: This quasi-experimental study was performed between September 2013 and October 2014 in 95 medical students in Mashhad University of Medical Sciences. Role-playing and oral (plus Microsoft PowerPoint) presentation were done by one assistant professor. There were no changes in the educational content nor the classroom. Using random numbers, half of each group received one of the methods as the first class and vice versa. At the end of each session, the standard satisfaction evaluating questionnaire was filled by the students.

Results: During the one-year duration of this study, 95 students were evaluated, and 46 (60%) of them were female. The mean age was 22.5 $\pm$ 1 years, and 28 (87.5%) were single. Role-playing had a mean rank of 54.64, and oral presentation had 21.45 ($P < 0.001$). This difference was present based on gender as well ($P < 0.001$). The satisfaction score was significantly higher for role-playing ($P < 0.001$).

Conclusions: Role-playing can be much more helpful in education and needs to be incorporated into the lesson plans.

Keywords: Role-Playing, Education, Medicine, Non-Randomized Controlled Trials, Student, Oral Presentation

1. Background

High-quality medical practice requires communication skills. Learning these skills is mainly based on observing the professional behavior of the teachers. Unfortunately, there is no specific emphasis on these skills in the current curriculum. Some concerned teachers have turned to special teaching methods to cover this gap (1-3).

Some studies have shown that the traditional education methods like an oral presentation or a modern version of it, i.e., Microsoft PowerPoint presentation, are mostly teacher-centered, inactive, and have the least efficacy in terms of learning. On the other hand, newer student-centered methods like role-playing promote active learning and have higher efficacy (4). Besides, most experts suggest that training in controlled conditions can promote the acquisition and performance of the necessary skills. The more realistic the training environment, the higher will be the efficacy (5).

Role-playing, a powerful teaching technique in face-to-face education, is a teaching strategy that fits within the social family of models. This method may refer to role training, where people rehearse situations in preparation for a future performance or, sometimes, to improve their communication abilities (6). This strategy emphasizes the social nature of learning and promotes cooperative behavior by stimulating the students both socially and intellectually (7).

In role-playing, the participants feel themselves to be in a real situation and act as necessary. Use of this technique can improve the patient-oriented interviews. Some studies have shown the various advantages for this method including increasing motivation, more active participation of the students, reducing shyness, acquiring new attitudes and accepting the social norms, reinforcement of management and organization skills, and preparing the overall condition for discussion. However, this method has its limitations as it may not be considered as a serious educational method, and adequate time and various equipment are required (1).

A presentation software mostly accompanies an oral

presentation. Microsoft PowerPoint is the most commonly used software. Studies have shown contradictory findings regarding the efficacy of using this tool. The core advantages of using Microsoft PowerPoint alongside the oral presentation are the capability to use various fonts, colors, pictures, and even video clips. However, reduction of the interaction between the presenter and audience and prevention from starting a discussion are some of its limitations (8). To the best of our knowledge, these two methods have not been previously compared. Considering all these issues, this study aimed to compare role-playing and oral (plus Microsoft PowerPoint) presentation as teaching methods.

2. Methods

This quasi-experimental study was performed between September 2013 and October 2014. All 5th-grade medical students who attended a specific class were included in this study. There were no exclusion criteria. This class was conducted for the first time by the community medicine department of Mashhad University of Medical Sciences, Mashhad, Iran. Based on a regular schedule, a group of these students was introduced to this department each month to complete this course.

Two similar educational contents (taking a good medical history from an elderly patient) were presented using the two different methods: (a) Role-playing and (b) oral plus Microsoft PowerPoint presentation. Using randomization, half of each group received method A as the first class and vice versa. There was a one week gap between these two methods for each group.

In this study, we used the following steps for the role-playing protocol: (1) Preparation and explanation of the activity by the teacher (warming up); (2) selection of the participants and assigning the roles; (3) gathering the required equipment; (4) preparing the students for watching the role-play; (5) role-playing; (6) discussion or debriefing after the role-play activity; (7) role-playing again; (8) discussion or debriefing after the second role-play activity; and (9) generalizing the experiments. These steps were adapted for the educational content.

In the oral plus Microsoft PowerPoint presentation, we used the relevant Persian slides along with additional explanations wherever needed. At the end of the session, the questions of the students were answered.

At the end of each session, all the students filled a satisfaction questionnaire. It had 18 questions in Likert Scale (from 1-completely disagree to 5-completely agree), covering four main domains. These domains included workload, improving communication skills, methods of training, and quality of training. Although this questionnaire had been validated previously (7), its reliability was confirmed again by the medical education and community medicine experts. The validity of the questionnaire was approved based on a Cronbach's alpha of 0.89.

All classes were held by one assistant professor for both of the methods, and there were no changes in the educational content nor the classroom. The difficulty of the educational content and topics for these two classes were approximately similar (the same topic but from two references which were approved by expert opinion). Each group finally participated in both of the classes. Each class, irrespective of the method used, was 100 minutes long.

Statistical analysis was performed using SPSS 11.5. Mann-Whitney U, Wilcoxon Signed Rank, and Chi-Square tests were used with a significance level of 0.05.

3. Results

During the one-year duration of this study, 95 students were evaluated of which 46 (60%) were female. The mean age of the participants was 22.5 $\pm$ 1 years (range, 21 - 26 years), and 28 (87.5%) were single.

The mean rank score of satisfaction for role-playing was 54.64, and for oral plus Microsoft PowerPoint presentation was 21.45 ($P < 0.001$). The difference between these two methods was also present with regard to gender ($P < 0.001$).

In the age group of 21 - 23 years, the role-playing method had a significantly higher satisfaction score compared with oral presentation ($P < 0.001$). However, no significant difference was observed in the 24 - 26 years age group (Table 1).

The satisfaction score based on the four different domains is illustrated in Figure 1. In all dimensions (1, workload; 2, improving communication skills; 3, method of training; 4, quality of training), the role-playing method had significantly higher scores ($P < 0.001$). This difference was also seen between the genders ($P < 0.001$).

Table 1. Comparison of the Mean Rank Score of Satisfaction in the Two Groups Based on Gender and Age

	Oral Plus Microsoft PowerPoint Presentation	Role-Play	P Value
Gender			
Male	9.21	17.41	0.001
Female	5.17	26.25	< 0.001
Age group, y			
21 - 23	15.21	40.23	< 0.001
24 - 26	2.00	5.50	0.17

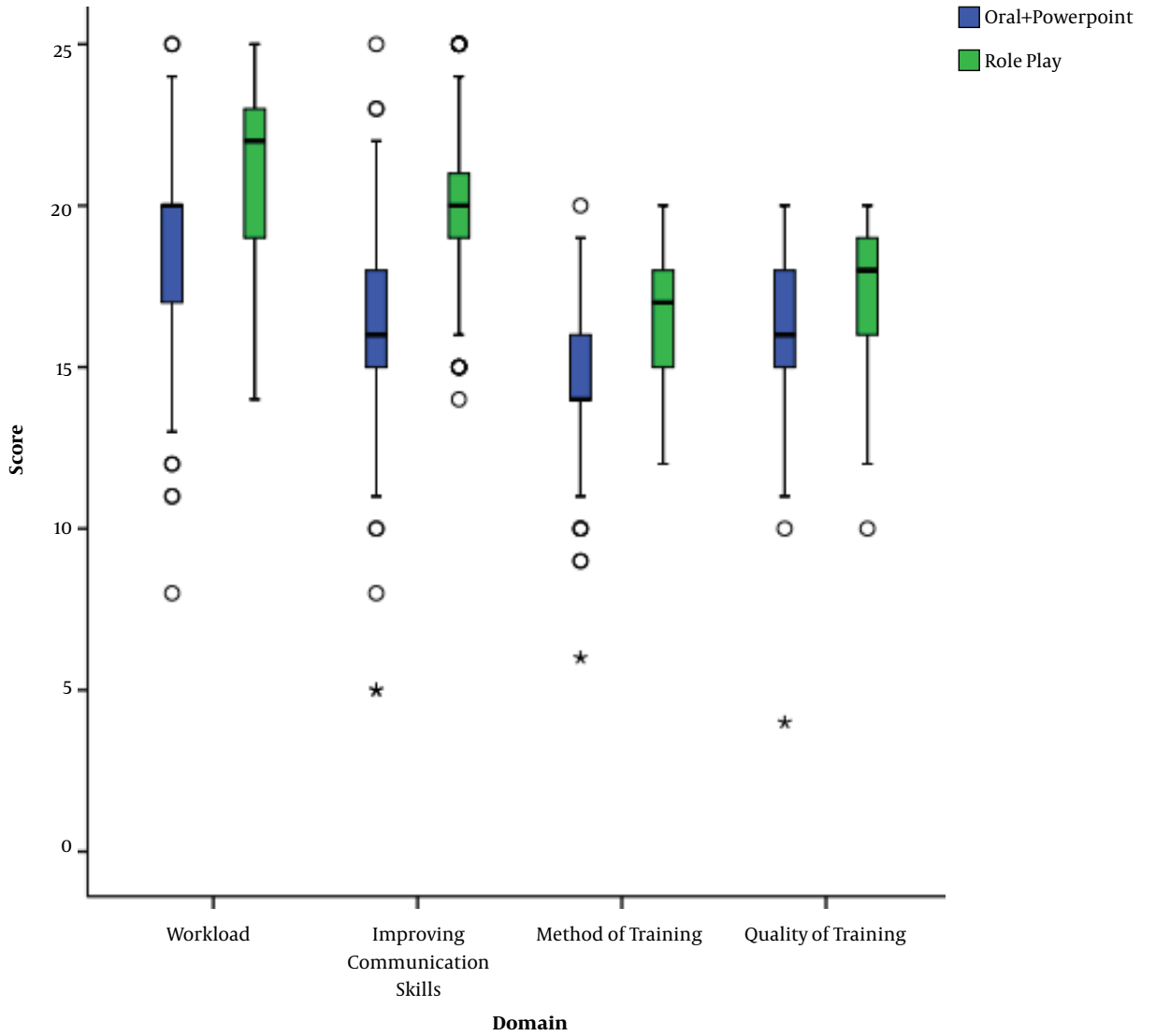

Figure 1. Score of the two groups based on four different domains

4. Discussion

This study showed that the role-playing method had significantly higher scores than the traditional oral plus Microsoft PowerPoint presentation in all four dimensions of satisfaction. This difference was also observed with regard to gender. The significant superiority of role-playing in the 21 - 23 years age group and the absence of this relation in the 24 - 26 years age group could be due to the lower number of participants in the latter age group.

Managheb et al. compared role-play and group discussion in the practice of medical interns of breaking bad news. They concluded that both methods could improve the skills of the interns, but role-playing was associated with a greater increase in the post-intervention score (1). Also, it has been shown that observation and discussion of the behavior of other persons are the first preferences of role-playing (9). Moreover, innovative ideas and acquiring a wide view of the educational issues are the other benefits of this method (10, 11).

Sutcliffe (12) and Steinman and Blastos (13) have shown the superiority of role-playing over oral presentation in two separate studies. It has been claimed that role-playing can cause the actual manifestation of the student's technical skills (11).

Similar to the present study, a considerable number of

researchers insist that interactional education under complete observation for practicing new skills can reduce the practical and theoretical gap (14-16). It seems that role-playing actuates the participants to think about the role and is the beginning of a thorough understanding of the educational content (16).

In a recent study, half of the medical students claimed that Microsoft PowerPoint-based classes suppress the activity of the students, and approximately 70% desire to have more discussion in these sessions (17). However, it has been shown that using animations and engaging students more efficiently can address this problem (18). This controversy that some students like PowerPoint presentations and some do not seem to be related to the teacher's responsibility to try to break the sense of the rigid preset of these sessions (19, 20). A qualitative study showed that regardless of the nature of technology of the educational methods, the way the teacher uses them determines the final efficacy (6).

One of the limitations of this study was the lack of the ability to control the class (sometimes the students did unplanned works) in the role-playing method. Also, there is a lack of similar studies for comparison with the current study. However, due to the low cost of and high interest among the students in the role-playing method, it is highly suggested that, even as a pilot study, other medical universities also try this method. To the best of our knowledge, this was the first study which compared these two methods in an academic environment.

Regardless of the benefits and disadvantages, it seems that role-playing can be a highly effective method of education that needs to be incorporated into the lesson plans. Although performing similar research in other universities may help to confirm the robustness of these findings, we believe that selecting the proper method is mainly dependent on the viewpoint of the teacher. This enables the teachers' to control the class, the educational content, the physical environment, and so on. There is no one rule for all.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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The Relationship Between Critical Thinking Disposition and Self-Esteem in Midwifery Students

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Abstract

Background: Students' personal characteristics are among the factors influencing the development of their critical thinking. Self-esteem is a normal influencing personality trait. Self-esteem affects all the aspects of individuals' lives including the way of their thinking and performance.

Objectives: Therefore, the current study aimed to determine the relationship between critical thinking disposition and self-esteem in the midwifery students of Mashhad University of Medical Sciences in 2014.

Methods: This cross sectional study was carried out on all bachelor students (N = 53) of the Mashhad Nursing and Midwifery Faculty. Data were collected through a personal information form, the Rosenberg's self-esteem questionnaire, and the California critical thinking disposition questionnaire. The collected data were analyzed in SPSS through descriptive statistical methods and a Pearson correlation coefficient test.

Results: The vast majority of students (62.26%) had an unsteady critical thinking disposition. However, 84.90% of them had a moderate level of self-esteem. Pearson correlation test showed no significant relationship between critical thinking disposition and self-esteem ($P > 0.05$).

Conclusions: According to the study results, the vast majority of the study cases had a moderate level of self-esteem with an unsteady critical thinking disposition. There was no significant relationship between critical thinking disposition and self-esteem in the studied midwifery students.

Keywords: Self Esteem, Critical Thinking, Midwife

1. Background

Midwifery is a functional profession (1) where clinical training constitutes the main part of the undergraduate midwifery training. The aim of clinical training is to teach how to use theoretical issues in clinical situations and provide an opportunity to institutionalize the role of a midwife in midwifery students. Nevertheless, theoretical training is not always manifested in students' performance (2) so that in real clinical situations, they are confused and cannot fulfill the task of the patient care (3). As individuals who enter medical care systems in the near future, midwifery students should have decision-making and problem-solving skills. The skills are under the influence of critical thinking (4, 5).

Critical thinking is a targeted, judgmental, and essential process that is necessary for the growth and evolution of any society and organization. However, it includes a criterion based on which a judgment is founded. It is composed of two aspects: Skill and disposition. Skill concentrates on cognitive strategies while disposition emphasizes the perceptual components of thinking, as well as inherently sustainable motivations for problem-solving (6, 7). Relying on critical thinking, one should be equipped with this skill against problems. Without a positive disposition toward critical thinking (the emotional aspect), this type of thinking will not be realized (8). The study by Rochester et al. on graduated midwifery students in Sidney showed that the students lacked the necessary capabilities in real work conditions and faced problems (9). The personal characteristics of students are among the essential factors affecting the development of critical thinking (8).

Self-esteem is an influencing normal personal characteristic (10). The extent of self-esteem affects all the aspects of individuals' lives including the way of their think-

ing and performance (11). Barkhordari et al. showed that there was a significant positive relationship between critical thinking disposition and self-esteem (8) while a study by Iranfar et al. showed that there was a significant negative relationship between critical thinking disposition and self-esteem (12). The results of Abasi et al. on medical students showed that there was a direct positive correlation between critical thinking and self-esteem (13). A study on nursing students concluded that the tendency to critical thinking was low and a positive relationship was observed between the tendency to critical thinking and self-esteem (14).

2. Objectives

While this is an important subject, there are a few studies in this area in Iran. Therefore, this study aimed to determine the extent of the relationship between critical thinking disposition and self-esteem in midwifery students of the nursing and midwifery faculty, Mashhad University of Medical Sciences.

3. Methods

This cross sectional (descriptive-analytical) study was carried out on midwifery students of the nursing and midwifery faculty, Mashhad University of Medical Sciences, in 2014. The census method was used for recruiting the sample. The study cases were all undergraduate midwifery students of semesters 3, 5, and 7 (N = 53) in the first half of the academic year 2014 - 2015.

The inclusion criterion was the consent for participation in the study. Transferred or guest students, students with medical diseases, confirmed mental diseases, and background of depression, and experiencing important events including relatives' death, marriage, pregnancy, childbirth, and accidents during the previous three months were excluded from the study.

Data were collected using a personal information form, the Rosenberg self-esteem questionnaire, and the California critical thinking disposition questionnaire. The personal information form included demographic information like age, residence status, and marital status.

The Rosenberg self-esteem questionnaire included 10 general statements consisting of five sentences with positive words and five sentences with negative words. Each question was scored on a four-point scale of completely agree, agree, disagree, and completely disagree. The score of each item ranged from 0 to 3 and the highest attainable total score was 30. The scores over 25, from 15 to 25, and below 15 indicated a high, moderate, and a low level of self-esteem, respectively (8, 15). The content validity of the questionnaires was confirmed in different studies and its reliability was confirmed using Cronbach's alpha (alpha = 0.89) (8, 15, 16).

The California critical thinking disposition questionnaire included 75 questions. A Likert six-point scale was used to score the questions (completely disagree, disagree to some extent, disagree, agree, agree to some extent, and completely agree). A point between 1 and 6 was allocated to the questions in accordance with the instruction manual of the questionnaire.

The questions were divided into seven subscales of truth-seeking (12 questions), exceptionable (12 questions), analytic power (11 questions), data organization power (11 questions), self-confidence (9 questions), the extent of maturity (10 questions), and exploration (10 questions).

The minimum and maximum scores of the questionnaire were 70 and 420, respectively. A score above 350, between 280 and 350, between 211 and 279, and below 210 indicated strong and sustainable disposition, positive moderate disposition, unsteady disposition, and completely negative disposition, respectively. The content validity of the questionnaires was confirmed through different national and international studies and their reliability was confirmed using the Cronbach's alpha test (alpha = 0.75) (6, 17).

Following the approval of the ethics committee of the university, the study objectives were explained to the participants and the signed written consent forms were collected. The personal information form, Rosenberg's self-esteem questionnaire, and California critical thinking disposition questionnaire were filled out by the cases within 30 minutes (during their free times). The collected data were analyzed by SPSS version 16 using descriptive statistics and Pearson correlation tests. First, the normal distribution of quantitative variables was confirmed using the Kolmogorov-Smirnov test. In all tests, the confidence and significance levels were set at 95% and 0.05, respectively.

4. Results

The mean age of the study cases was 23.41 (SD = 1.08) years. They had a mean GPA (grade point average) of 16.31 (SD = 1.05). Of the study cases, 63.6% were single and 45.0% were living in a dormitory. According to the results, the vast majority of cases (62.26%) had an unsteady critical thinking disposition. However, 84.90% of them had a moderate level of self-esteem (Table 1).

The mean scores of critical thinking disposition and self-esteem were 260.1 ± 38.18 and 16.54 ± 2.34, respectively.

Table 1. The Frequency of Critical Thinking Disposition in the Studied Midwifery Students in Terms of Self-Esteem[a]

Critical Thinking Disposition	Moderate Self-Esteem	Low Self-Esteem	Total	Fischer Exact Test Result
Positive	12 (22.64)	3 (5.66)	15 (28.30)	Exact $\chi^2 = 0.728$, P = 0.557, df = 2
Unsteady	28 (52.83)	5 (9.43)	33 (62.26)	
Negative	5 (9.43)	0 (0.0)	5 (9.43)	
Total	45 (84.90)	8 (15.09)	53 (100)	

[a]Values are expressed as No. (%).

Pearson correlation test showed no significant relationship between critical thinking disposition and self-esteem (P > 0.05). There was no significant relationship between personal (age, marital status, and residence status) and educational variables, on the one hand, and critical thinking disposition and self-esteem, on the other hand (P > 0.05).

5. Discussion

The results of this study revealed that there was no significant relationship between critical thinking disposition and self-esteem in the midwifery students studied. The vast majority of them had a moderate level of self-esteem with an unsteady critical thinking disposition. In various studies, self-esteem has been mentioned as one of the emotional factors influencing the tendency to critical thinking, but the results of this study indicated there is no meaningful statistical relationship between the tendency to critical thinking and self-esteem (8). The tendency to think critically emphasizes the attitudinal components of internal thinking and motivation for problem-solving. Without a positive tendency toward critical thinking, the emotional dimension of this type of thinking does not occur or stands below the standard level (8). Critical thinking has emotional components and mental habits (18). Self-esteem is just one of the psychological dimensions that may affect critical thinking, and other psychological variables are influenced by various factors (13).

The results of the study of Iranfar et al. on 289 medical students in Kermanshah showed that there was a significant negative relationship between the tendency toward critical thinking and self-esteem and increased self-esteem was associated with decreased tendency toward critical thinking; the results that are not consistent with the results of the current study. Iranfar et al. reported unusual findings in their study that the students' perspective naturally affects their personality. In our country, students are working hard to admit to the university, especially in the field of medicine and certainly, those who are accepted in this field are clever and hard working. Therefore, it is not unexpected that they think they are excellent and have high self-esteem and eventually when entering the university, they believe that their actions or thoughts are better and faster than those of others are. This attitude is wrong and causes these students to ignore the critical principles of critical thinking that are focused on the ideas and beliefs of others (12). This is while pride varies with self-esteem. Self-esteem is the satisfaction of one's self and having a sense of worthiness. In fact, the level of harmony and proximity is the ideal and the real self in a person (19).

The results of Barkhordary et al. showed that there was a significant positive relationship between the tendency toward critical thinking and self-esteem, which the results of these studies are not consistent with the results of the present study. It is possible that these results indicate that the current curriculum of nursing education does not use modern methods of teaching and education, which will lead to the development of this aspect of critical thinking in the students, as well as effective and better learning (8).

The results of the study by Ip et al. (20) showed that the tendency to critical thinking in most studied students was unstable, and the results of Abasi et al. showed that the tendency to critical thinking in the majority (53.3%) of medical students studied was unstable (13), which is consistent with the results of the present study. The results of Sabouri Kashani et al. on the medical students of Tehran and Mashhad Universities of Medical Sciences showed that critical thinking tendency in students was at the positive and intermediate levels (21).

The results of the study by Shin et al. showed that the tendency to critical thinking in nursing students was positive (22), which may be due to differences in academic discipline, academic level, educational environment, and teaching methods.

Considering that other factors can affect students' critical thinking and self-esteem, it is suggested that further research is conducted in this regard.

5.1. Conclusion

The results of this study revealed that there was no significant relationship between critical thinking disposition and self-esteem in the studied midwifery students. The vast

majority of the studied cases had a moderate level of self-esteem and an unsteady critical thinking disposition. Conducting comprehensive studies for identifying the influential factors in positive critical thinking disposition is recommended in order to find solutions for promoting this way of thinking.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Acknowledgments

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Critical Thinking Disposition in the First- and Last-Year Medical Students and its Association with Achievement Goal Orientation

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Abstract

Background: Since medical students play an important role in public health system as well as the treatment of patients, the need for critical thinking in them is extensively felt. The current study aimed at evaluating the level of critical thinking disposition (CTD) in the first- and last-year medical students and its association with goal orientation in Ahvaz Jundishapur University of Medical Sciences in 2016.

Methods: The current cross sectional study used critical thinking disposition inventory (CTDI) developed by Rudd and Ricketts, and achievement goal questionnaire-revised (AGQ-R) developed by McGregor and Elliot to collect data. The questionnaires were distributed among 255 students of which 204 (80%) students completed them. Data were analyzed using *t*-test and Pearson correlation coefficient.

Results: Of the 204 studied subjects, 104 were the first-year and 100 the last-year medical students. The mean age of the first and last year of medical students was 18.930.86 and 24.601.31 years, respectively. Moreover, 47 first-year and 66 last-year subjects were female. The mean score of CTD for the first- and last-year students were 69.82 $\pm$ 10.60 and 71.48 $\pm$ 11.86, respectively, lower than the average range. Based on the *t*-test results, there was no significant difference between this group students (P = 0.310). The mean score of CTD and AGQ for all the study participants was 70.75 $\pm$ 11.12 and 28.22 $\pm$ 7.76, respectively; a significant correlation was observed between critical thinking disposition and achievement goal orientation (P = 0.001, r = 0.294).

Conclusions: The results of the current study indicated that the CTD score was lower than average range in the first- and last-year students; besides, lack of difference between first and last year students emphasized that educational processes should be propelled toward employment of approaches to promote and strengthen critical thinking disposition.

Keywords: Critical Thinking Disposition, Achievement Goal Orientation, Medical Students, Medical Education

1. Background

Critical thinking is a type of reasonable, regular, purposeful, effective, logical, and outcome-based thinking, which scientifically evaluates and analyzes all available data and comments. Hence, teaching this type of thinking is among the basic needs of human life for decision making and deep understanding of different issues. Education of critical thinking results in motivation in learning, acquiring problem-solving and decision-making skills, and creativity (1-3).

Critical thinking includes two aspects of skills and disposition, and such a type of thinking is just emerged under the light of positive tendency (4). Critical thinking disposition recently attracted the attention of researchers; it is considered as an aspect of personality, desires, and tendencies of individuals that indicate the type of their critical thinking. Disposition and skills of critical thinking are basically the desirable consequences of educational processes (5, 6). Ricketts and Rudd indicated that tendency toward critical thinking is formed based on an intrinsic motivation; they also considered innovativeness, maturity and engagement as the components of critical thinking disposition (7). It is obvious that adequate tendency toward development and application of skills is essential, and critical thinking without tendency toward such factors is impossible (2).

Different studies indicated that disposition toward critical thinking affects personal and social achievements, problem-solving ability, and creativity. People with high disposition toward critical thinking can predict affairs and seek opportunities to employ argumentation ability in

decision-making and problem-solving by the reasoning ability (8).

Critical thinking is the ultimate goal of higher education and the basis of clinical reasoning. By strengthening this type of thinking, the care provider can make proper medical decisions and provide better health care services. Experts emphasize on critical thinking skills to promote the quality of medical education. In terms of accreditation of colleges, critical thinking is a key point and a criterion to measure the growth of such thinking among students (9-11). According to the World Federation for Medical Education (WFME), critical thinking is one of the standards of medical education (12).

Growth and development of critical thinking help the students to improve their skills in thinking and reasoning instead of memorizing the information; this issue is particularly important in medical education and other care-related careers, to such an extent that is essential to have the problem-solving and decision-making abilities to provide a proper health care for patients. Hence, to teach medical students about providing proper health care for patients in the current modern era, education should be promoted by the strengthen of critical thinking. Therefore, to be aware of the status of this type of thinking in educations provided in universities, the level of critical thinking should be appraised in the students (13-15).

The achievement goal theory and its correlation with disposition toward critical thinking is another variable considered by the researchers, which plays a significant role in the quality of learning process, academic achievement, success, and competency. Without benefitting from adequate motivation and self-confidence, it is impossible to create commitment, effort, and perseverance (16).

In recent years, different studies were conducted on critical thinking disposition. Results of the study by Salsali et al., on the evaluation and comparison of critical thinking disposition in Asian and non-Asian students showed that the disposition toward critical thinking was lower in Asian students than their non-Asian counterparts (6). In a study by Gezer et al., conducted in Turkey, the level of critical thinking disposition in nursing students was poor (16). Review of the studies showed that the level of critical thinking disposition in Iranian students was rarely higher than medium level and in most of the cases, no significant association was observed between the grade and level of in critical thinking skills and disposition (13, 17, 18). There was a significant difference among the results of some studies regarding the level of critical thinking disposition in the students of different grade levels (13). Some other studies indicated the lack of association between the critical thinking disposition and grade level in the students. Faal Ostadzar in a study in Isfahan, Iran, evaluated the level of critical thinking disposition among the second grade basic sciences and pre-internship students and reported a poor and unstable level of critical thinking disposition in the students; they also showed no significant difference between the students of the two grades (19).

Achieving a real image of the level of disposition in the students of different grade levels toward critical thinking, by determining the status of this index in the students can assist the education authorities of the university to promote critical thinking skills. Results of the studies performed in Iran also showed inadequacy of data and study in this field; most of the conducted studies emphasized a certain aspect of critical thinking (critical thinking skills) and the other aspect (critical thinking disposition) was less considered (11, 20).

Owing to the role of critical thinking in health system and since, some studies reported undesirable and poor status of skills and disposition toward critical thinking among the last year students (21, 22), authors decided to explored the level of critical thinking disposition in the first- and last-year medical students. The first-year students are newly admitted to the university and are not affected by the educational programs yet; in addition, the level of tendency toward critical thinking in such students is similar to that of pre-university students. On the other hand, the last-year students are undoubtedly affected by the educational programs and teaching methods due to several years of presence at academic environments, and attending different courses can definitely promote and improve the level of critical thinking disposition in such students. The two under study groups were considered as good samples to compare the level of critical thinking disposition and find the effect of curriculums on the improvement of such disposition in the students. Due to the great importance and remarkable role of critical thinking in the professional future of medical students, the need for benefiting from the ability to analyze critical thinking disposition in the complicated and vital environment of the health system, which they should work in it after graduation, and also due to some reports about lower level of critical thinking disposition and clinical judgment of medical students, inefficiency of common teaching methods to promote critical thinking disposition among medical students, and since no comprehensive study was conducted so far in the under study university on the critical thinking disposition, the current study aimed at evaluating the level of critical thinking disposition among first- and last-year medical students, comparing the results, and also evaluating the association between critical thinking disposition and achievement goal orientation in the two groups of first- and last-year medical students of Jundishapur University of Medical Sciences, Ahvaz, Iran in 2016.

2. Methods

The current descriptive, cross sectional study was conducted in 2016 academic years on all the first- and last-year medical students of Jundishapur University of Medical Sciences, as the statistical population (n = 255). The inclusion criteria were willingness to participate in the study and filling out the questionnaire, and the exclusion criteria were lack of interest to participate in the study and not filling out the questionnaire.

Data collection tool had two parts: First, demographic characteristics of the students including age, gender, and year of admission to school, and the second part included critical thinking disposition inventory (CTDI) developed by Ricketts and Rudd (7) and achievement goal questionnaire-revised (AGQ-R) developed by Elliot and McGregor (22). The validity and reliability of the Persian versions of both questionnaires were confirmed in previous studies (15, 23).

Critical thinking disposition inventory: CTDI is a 33-item questionnaire that appraises three aspects of innovativenes (11 items), maturity (9 items), and engagement (13 items), and the items are scored based on a 5 point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The reliability coefficient for CTDI was 0.84 in the study by Ricketts and Rudd (7) and 0.66 in the study by Pakmehr et al. (23).

In the present study, reliability was 0.82, 0.69, 0.51, and 0.78 for the total questionnaire as well as innovativenes, maturity, and engagement subscales, respectively, using Cronbach's alpha coefficient. Pakmehr et al., confirmed the structural and factor validity of the questionnaire using confirmatory factor analysis (23). Face validity of the current study questionnaire was also evaluated and confirmed by five experts of educational sciences.

The scores ranged from 33 to 162 in the current study (mean: 99); hence, 99 was considered the medium level in the assessment of level of critical thinking disposition. The scores obtained in the current study ranged 11 - 55 (mean: 33) in innovativenes, 9 - 45 (mean: 27) in maturity, and 13 - 65 (mean: 39) in the engagement subscales (7).

The achievement goal questionnaire-revised: AGQ-R is a 12-item instrument scored based on a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree), including four orientation aspects as mastery-tendency, mastery-avoid, function-tendency, function-avoid (each of three items).

The validity of AGQ-R was evaluated in a study by Azizi et al.; they calculated Cronbach's alpha as 0.77 (15). In the current study, the validity of total questionnaire was measured using Cronbach's alpha as 0.84. The reliability of AGQ-R was confirmed by exploratory and confirmatory factor analysis in a study by Ning (24). In the study by Azizi et al., the face and content validity of the questionnaire were evaluated and confirmed by seven professors in psychology of education (15). In the current study, face validity of AGQ-R was confirmed by five professors in educational sciences. The score range obtained in the current study was 12 - 60 (mean: 36); to evaluate the level of achievement goal orientation, 36 was considered as average (15).

After obtaining permission from the medical school, the author referred to classes and different hospital wards to explain the study objectives to the first- and last-year students; then, after obtaining consent and willingness of the students to cooperate with the study, the questionnaires were distributed and collected immediately after completion. The questionnaires were anonymous and the students were assured of confidentiality of their information.

Data were expressed as mean $\pm$ standard deviation (SD). To compare mean scores between the groups, *t*-test was used; and to evaluate the relationship between variables, Pearson correlation coefficient was employed. Finally, data were analyzed with SPSS version 20 (IBM Corporation, Armonk, NY). $P < 0.5$ was considered the level of significance. To evaluate the normality of data, the Kolmogorov-Smirnov test was used and since P value > 0.05 was obtained for the subscales of tendency toward critical thinking and achievement goal orientation in the test, the results confirmed the normal distribution of data and accordingly, parametric tests were used.

3. Results

Of the total 255 questionnaires distributed among the students, after exclusion of incompletely filled out or not completed questionnaires, 204 questionnaires were analyzed (80% response rate). Of the 204 students that completed the questionnaires, 104 (50.98%) were the first-year and 100 (49.02%) the last-last students. The mean age of the first-year students was 18.93 $\pm$ 0.86 years (ranged 18 to 22) and that of the last-year students was 24.60 $\pm$ 1.31 years (ranged 22 to 27). In terms of gender distribution in first- and last- year students, 47 (48.5%) and 66 (68.0%) subjects were female, respectively.

The mean total score of tendency toward critical thinking was 70.75 $\pm$ 11.12; the mean score of subscales of innovativenes, maturity, and engagement were 18.63 $\pm$ 4.20, 24.40 $\pm$ 4.13, and 27.26 $\pm$ 6.02, respectively. Table 1 shows the mean score of critical thinking disposition in the two study groups. Based on the study findings, the mean total score of critical thinking disposition in the students was lower than average. Comparison of the mean total score of critical thinking disposition between the first- and last-year students using *t*-test showed no significant difference

between the groups. Comparison of the mean scores of subscales indicated that except for maturity, there were no significant differences between the groups in terms of the two other subscales.

The mean score of critical thinking disposition in males and females were 70.85 ± 11.85 and 70.53 ± 10.89, respectively; based on the *t*-test results, no significant difference was observed between the genders in terms of critical thinking disposition (P = 0.840).

The mean total scores of achievement goal orientation in the first- and last-year students were 28.22 ± 7.76 and 27.19 ± 6.98, respectively. Results of *t*-test showed no significant difference between the first- and last-year students in terms of achievement goal orientation (P = 0.059). The mean score of AGQ was also compared between the genders and no significant difference was observed between males and females in this regard (the mean score of AGQ in females and males were 27.51 ± 7.52 and 29.21 ± 6.98, respectively; P = 0.132).

Based on the results of Pearson correlation coefficient, no significant association was observed between the critical thinking disposition and students' age (r = 0.059, P = 0.416), but there was a significant relationship between critical thinking disposition and achievement goal orientation in the students (r = 0.294, P = 0.001).

4. Discussion

The current study was conducted to evaluate critical thinking disposition in the first- and last-year medical students and its association with achievement goal orientation; results showed that the mean total score of critical thinking disposition in the first- and last-year medical students was lower than average. In addition, there was no significant difference between the first- and last-year students in terms of critical thinking disposition. It can be said that there was no superiority for last-year medical students in disposition toward critical thinking to their first-year or recently admitted counterparts. It seems that medical schools do not pay adequate attention to critical thinking disposition in medical education and under such circumstances, students do not receive a proper education in this regard; the point that should be considered as a serious warning. Results of the current study were in agreement with those of Barkhordari (17), Haghshenas and Sajjadian (25), Iranfar et al., (26), and Rezaeian et al. (27), that reported no significant difference between the first- and last-year, and/or internship students in terms of critical thinking disposition.

Although it was expected that the internship students (the highest grade in medical education) should benefit from higher levels of critical thinking disposition and use it more than their counterparts in lower grades due to higher educational level and direct contact with clients, and higher professional sensitivity regarding patients' health and life, findings indicated the lack of significant difference between the first- and last-year medical students in terms of critical thinking disposition; however, lack of difference indicates that medical curriculum has inconsiderable effects on the disposition of medical students toward critical thinking. In other words, critical thinking disposition is not considered in medical curriculum as an important goal and its developmental methods are not foresighted and implemented. From possible factors leading to such results, educational systems and university curriculums, teachers and teaching methods, students' evaluation system, and inadequate motivation of students are noteworthy (28).

In a review study by Chan on critical thinking disposition in medical education, results showed that shifting pedagogical approaches from passive trainings and memorizing methods to active and problem solving methods promotes the disposition toward critical thinking (29). Findings of a study on medical students in China reported a significant relationship between critical thinking disposition and problem-based learning (30). Therefore, since educational environments create appropriate opportunities and atmospheres for interaction, and provide contexts to promote critical thinking disposition, it would be worthy if the educational authorities of universities provide the context for development and promotion of critical thinking skills among senior medical students by paying enough attention to disposition toward critical thinking.

Findings of the current study indicated that of the total components forming critical thinking disposition, the mean score of maturity subscale was significantly higher in the last-year students; the results indicated the influence of more experience of studying at university on this type of thinking in seniors compared with freshmen. Some studies reported a significant difference between the first- and last-year students in the mean score of critical thinking disposition or some of its subscales (20). The content of educational programs, method of teaching, and educational environment and atmosphere can significantly affect the critical thinking disposition in different universities; controversial and various results of different studies can be explained by such factors. Definitely, educational environments, which create appropriate opportunity and atmosphere for interaction, provide context for the promotion of critical thinking disposition.

According to the results of the current study, no significant difference was observed between male and female students in terms of the score of critical thinking disposition. Results of studies by Mousazadeh et al. (31), and

Table 1. Comparison of the Mean Score of Critical Thinking Disposition and its Three Subscales Between First- and Last-Year Students

Variable	First-Year Students	Last-Year Students	*t*	P Value
Innovativeness	18.48 ± 4.05	18.81 ± 4.45	-0.538	0.590
Maturity	23.53 ± 3.68	25.03 ± 4.37	-2.578	0.010
Engagement commitment	27.81 ± 6.06	27.64 ± 6.08	0.195	0.840
Total score of critical thinking disposition	69.82 ± 110.60	71.48 ± 11.89	1.022	0.310

Haghshenas and Sajjadian (25), also confirmed the current study findings. These studies conducted on critical thinking disposition, also reported no significant difference between male and female students in this regard (5, 31). In addition, no significant association was observed between the total score of critical thinking disposition and students' age; the results were consistent with those of Gharib et al. (28), although more disposition and use of critical thinking skills were expected by age and experience increase (28).

Results of the current study also indicated a significant relationship between critical thinking disposition and achievement goal orientation; similar results were reported by Azizi et al. (15), Dehghani et al. (32), and Poondej et al. (33). Findings of some studies indicated that people with higher achievement goal orientation, benefit from extensive insights and use problem solving and critical thinking strategies to solve different problems. In fact, achievement goal orientation is associated with the level of success, tendency, and interest to deal with challenging issues and benefitting from related deep learning and critical thinking strategies (15).

Since achievement goal orientation is a method to judge personal competence and beliefs about different achievements, students should be directed to use criteria in the definition of competency mostly relying on exact understanding of personal skills and abilities. Nevertheless, results of some studies indicated that the type of achievement goal orientation was associated with the level of success and tendency toward dealing with different problems and critical thinking (34). Hence, teachers can promote the level of critical thinking disposition in students by motivating them and making them interested in future.

Difficulty with access to medical students, particularly medical intern students, in hospitals and their lower interest to complete the questionnaire were among the limitations and problems to perform the current study.

4.1. Conclusion

Results of the current study indicated that the status of critical thinking disposition in medical students was instable and lower than average, based on the employed scale; in addition, there was no significant difference between the freshmen and seniors in the level of disposition. But, a significant and positive association was observed between the achievement goal orientation and tendency toward critical thinking disposition.

Since people working in health sectors play a key role in public and community health, policy-makers and educational authorities should create the context to increase critical thinking skills and disposition by reforming the programs and providing appropriate educational facilities and environments.

To promote the critical thinking disposition, a revision in the educational system seems necessary.

Results of the current study can be considered as basic data for further curriculum intervention.

Since factors such as curriculum and teaching methods can significantly affect the students' tendency, it is recommended that university curriculums and teaching methods be revised to promote critical thinking disposition in students. Shifting to dialogue-driven teaching approaches is of great importance to promote critical thinking disposition in students.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Acknowledgments

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Footnote

Ethical Considerations: The current study was approved by the Ethics Committee of Jundishapur University of Medical Sciences (No. AJUMS.REC.13960550).

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Evaluation of the Rate of Data Transfer, Learning, and Ease of Access to Data via Data Visualization in Virtual Medical Courses from the Viewpoint of Teachers and Students in Shahid Beheshti University of Medical Sciences

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Abstract

Background: Data visualization refers to the methods of data presentation in visual formats using specific technologies, which can present data through a visual process with better understanding and recognition. The current study aimed at evaluating the rate of data transfer, learning, and ease of access to data through data visualization in virtual learning systems.
Methods: The current survey was conducted on 131 students and teachers of virtual medical courses at Shahid Beheshti University of Medical Sciences as the statistical population in the academic year 2015 - 2016. Of the study population, 79 subjects were selected using the simple random sampling method. Data collection tool was a 28-item researcher-made questionnaire, which its reliability was confirmed by the Cronbach's alpha 0.82.
Results: Based on the results of the current study, data visualization could significantly affect virtual learning in the students. In addition, data visualization improved productivity indices as well as rate of data transfer, learning, and ease of access to data among students and teachers.
Conclusions: Based on the results of the current study, it is recommended that data visualization be used in educational programs at all grades and courses in order to benefit from its advantages in improving productivity, rate of data transfer, learning, and ease of access to data among students and teachers of universities and institutes.

Keywords: Data Visualization, Learning Rate, Data Accessibility, Data Transfer Rate

1. Background

Application of pictograms and images to transfer concepts and thoughts has a very long history, which in addition to facilitating the communication, significantly helps to record and maintain human thoughts as pictographic and idiographic symbols. The ability of humans to receive information from the environment using the visual sense is not limited to signs and symptoms. By emphasizing the present-day human being in providing information, it is based on the study and recognition of these symbols and their ability to understand them.

The main objective of today's education is not to have access to more data. In fact, one of the main challenges of students is to mean the concepts they encounter, and absorb all the data purposefully. Hence, communication needs new approaches (1).

Visualization, in fact, is a new approach, which facilitates data-based decision-making more rapidly and accurately with less need for knowledge and education (in order to understand the data) and results in better data presentation, and consequently, effective data utilization. Based on this method, by the application of visual processes in data presentation, the users can have better understanding of the provided information, and may optimally recover their personal data. Data visualization skills are more important in recent years, and therefore, open a new chapter in visualization of data and computer-based data display (2). Data visualization systems benefit from human visual perception capabilities by the compression of a huge amount of textual data through controllable visualization. In this method, owing to high capacity of image-based data transfer, understanding and learning

abilities of the user are improved through the visualization of data. In addition, a huge amount of data is compressively changed into image formats with lower sizes and higher efficacy (3). Providing better conditions for the user to analyze data and thoughts are among the main objectives of using technologies and methods of visualization. Data visualization should not be mistaken with the presentation of simple images and pictures. By The visualization process transfers, data transferred to the user more effectively, which improves his/her understanding about the concepts (4).

The visualization can be applied in educational processes among which virtual education is a clear example. Since the basis of virtual education is the technological approaches, virtualization can be highly applicable. Virtualization, owing to its lexical meaning, is a type of illustration or picturing the data in order to be understandable and presumable for the audiences; although its concept is beyond the pictures. Many problems and challenges dealing with human in today's world can simply be administrated using virtualization; even in some cases, the virtualization is the only available solution (5).

Shahbeigi and Nazari in a study indicated that the purpose of education to recover knowledge is recently changed based on the particular conditions of each individual. Virtual education, as a relatively emerging method, seriously looks for this purpose. Although this type of education provides unique occasions for individuals via modern media such as internet, obstacles and problems are inevitable (6).

Kheyrandish indicated that the educational tools and methods are evolving in such a way that everyone can start learning in any specified time and place (7).

Doroudi and Soleimani Nejad indicated the significant role of visual communication in learning conceptual data, and stated that many conceptual data are transmissible through positive and effective interactions between the individuals. This useful method is now specifically available in digital environments using particular methods and technologies in order to help the users. In this method, basic skills such as data visualization, computer graphics, understanding the basics of arts, and particularly intellectual creativity are required to transfer data appropriately using data visualization processes. In fact, using this method, data visualization can be performed more rapidly and reliably; therefore, virtual environment is a suitable arena for the emergence of visualization applications (8).

Keim attended a web-based distant education course and developed a questionnaire. He concluded that four factors of feedback and important related services could be explained through Korean culture. By understanding the Korean conservative cultural effect, teachers can seek a specific required layout based on feedbacks and service-related factors, and even can look for the texts regarding web-based distance learning systems; however, the strategy is successful (9).

Results of a study by Liao et al., showed that the virtual laboratories to teach scientific materials at school could promote the students following the employment of attractive learning environments by illustrating figures and images in 2D format. On the other hand, results of their study indicated that improving virtual laboratories from two points: (1) Virtual laboratory integration; (2) the introduction of 3D measurement tools for virtual laboratories can greatly increase the reality and attractiveness of the test. In addition to helping empirical assignments, the virtual lab helps students understand better the scientific processes and useful rules. It also teaches students how to turn knowledge into action (10).

Spencen believes that the virtualization is a new approach through which the process of decision-making performs more rapidly and accurately with less cognitive efforts (11).

Sadeghi stated that with the introduction of virtual reality, the importance of data visualization is highlighted. The main application of virtual reality is in medical practices as well as active education of anatomy and physiology for medical students. Using this system, the students can have effective and desirable learning in a stimulated 3D environment. By the application of virtual reality in surgery training systems, to enhance the skill level of medical student, a certain case can be practiced virtually for thousands of times. Using this system and stimulating surgery environments, thousands of surgical cases can be repeated consecutively in a long time. The basis of this technology is realized by data visualization (12).

Nikravesh and Jalali in an experimental study using virtual lessons, and the atlases prepared in this way were asked to use a 60-person class in anatomy of the head and neck to create virtualized lessons. While the same class was not given to such a license, the impact of virtual education as a kind of complementary and non-attendance in the target group at the end of the course and with the design of the same exam questions based on a single referenced evaluation. By comparing the scores of the two distinct groups that the virtual training group had significantly higher grades than the second group (13).

Naderifar et al. showed that electronic learning (e-learning), alongside its wide range of applications and benefits, has some challenges such as less employment by the teachers due to lack of knowledge about its efficacy, diminution of teacher's role, lack of expertise in using it, fear of using it, certain cultural beliefs, and inadequate references. Successful e-learning in medical education requires infrastructures and standards (14).

In a study by Hakimzadeh and Afandideh, the quality of

e-learning course was at a relatively favorable level according to MSc students and teachers of medical education department (15).

In recent years, e-learning technology and educational technology resources in the form of audiovisual materials assisted the traditional education in data transfer rate, learning, and ease of access. The contribution of these educational technologies to medical education disciplines was more than other disciplines. Introduction of information technology was associated with the evolution both in hardware (equipment) and software (programs and resources) structures, to such an extent that they were continuously applied in most of the applied fields.

Following the evolution in e-learning, virtual education was quickly overwhelmed at a wider level without spatial and temporal constraints. In virtual education technologies, in addition to hardware and software structures, the communication infrastructure plays a more significant role. By the application of this technology in education, in addition to hardware, software, and communication infrastructures, the educational resources were the next most important aspect. This important aspect, by the help of data visualization, was introduced as an important indicator of virtual education and provided a new approach of virtual education to academic environments, particularly medical fields and related disciplines. Since medical resources are mainly graphic-based, the need for picturizing resources such as designing logos, frames, tapes, menus, and other items seem necessary. To implement virtual education in medical resources, if data visualization is performed at higher levels and qualities, the data visualization methods and technologies can help the educational system to improve communication with the learners and let them have better understanding of provided data and information using such facilities.

Visualization, with the help of presentation methods and useful information for the audience, provides the right environment for interaction and exchange of information. Because the value of information depends on its beneficial use, using appropriate methods in data visualization, maintaining the value of information is a good ground for beneficial education and better learning in students. The above issues emphasize the need for the current study.

The Virtual Medical School of Shahid Behshti University of Medical Sciences already admits students at Master's degree owing to a hypothesis that formatting and picturizing software items and medical resources data can provide suitable conditions for better learning and understanding in virtual education. The current study aimed at evaluating the effect of data visualization on virtual education of medical sciences in order to determine to what extent the visualization of data can increase productivity, rate of data transfer, learning, and ease of access to data among students and teachers of Virtual Medical School of the affiliated university.

2. Methods

The current study used descriptive-analytical method and was naturally a survey based on the employed data collection method. However, the educational resources of the medical courses in the past were provided with the visualization structure and can be very influential in the process of virtual training in terms of type, content and structure. In this study, we seek to evaluate the impact on increasing the speed of data transfer, increasing the speed of learning, ease of access to information, increasing the level of efficiency in the quality of knowledge and evaluation of information.

The statistical population of the current study included all students and teachers of Virtual Medical School (n = 131), Shahid Beheshti University of Medical Sciences in academic year 2015 - 2016. Of the total population, 79 subjects were selected by the simple random sampling method. Data collection tool was a 28-item researcher-made questionnaire including nine items in productivity improvement (items 1 - 9), six items in data transfer rate (items 10 - 15), seven items in learning rate (items 16 - 22), and six items in the ease of access (items 23 - 28). The items were scored based on a five-point Likert scale from very high to very low ranged 1 to 5 (3 as mean score). The validity of the questionnaire was confirmed by the experts and its reliability was confirmed by Cronbach's alpha of 0.82. To evaluate the normality of data in order to employ parametric or non-parametric tests, the Kolmogorov-Smirnov test was used. Since the variable scores had normal distribution, the parametric tests were used to analyze the data. Data were analyzed with SPSS version 22 (SPSS Inc., Chicago, IL) using *t*-test.

3. Results

Results of data analysis on the students and teachers viewpoints toward the effect of data visualization on virtual education (increased productivity, rate of data transfer, learning, and ease of access) using *t*-test to assess the study hypotheses in Shahid Beheshti University of Medical Sciences are shown in Table 1.

The mean score of the students and teachers viewpoints toward the effect of data visualization on virtual education was compared with the desired score (> 3), using *t*-test. Based on the measured mean (3.35) and (P = 0.01), the null hypothesis of the study was rejected; it means that the mean score of students and teachers was significantly

Table 1. The Analysis of Study Hypotheses Regarding Data Visualization in Virtual Medical Education from the Viewpoints of Teachers and Students of Shahid Behehti University of Medical Sciences, Using *t*-Test

Study Hypotheses and Questions	Mean ± SD	Mean Difference	Degree of Freedom	*t* Score	P Value
Effect of data visualization on virtual education for continuing education at the university	3.3582 ± 0.665	0.490	78	10.567	0.010
Effect of visualization on increased productivity in the students of virtual medical course	3.610 ± 0.596	0.610	78	9.100	0.020
Effect of data visualization on increased rate of data transfer	3.729 ± 0.608	0.729	78	10.660	< 0.001
Effect of data visualization on increased rate of learning	3.490 ± 0.589	0.490	78	7.378	< 0.001
Effect of data visualization on increased ease of access to data	3.503 ± 0.665	0.503	78	6.720	0.023

higher than 3 and consequently, visualization could significantly affect virtual education.

First hypothesis: It seems that visualization significantly affected productivity of students in Virtual Medical School of Shahid Beheshti University of Medical Sciences.

The mean score of students and teachers viewpoints towards the effect of data visualization on the students productivity was compared with the optimal score (> 3), using *t*-test. Based on the measured mean score (3.16), and since the calculated P value in the current study was lower than the considered level (P = 0.01), the null hypothesis was rejected. It means that the mean score of students and teachers viewpoints was significantly higher than 3; in other words, visualization could significantly affect the students' productivity.

Second hypothesis: It seems that data visualization can significantly affect the rate of data transfer in the students of Virtual Medical School at Shahid Beheshti University of Medical Sciences.

The mean score of students and teachers viewpoints towards the effect of data visualization on the rate of data transfer was compared with the optimal score (> 3), using *t*-test. Based on the measured mean score (3.73), and since the calculated P value in the current study was lower than the considered level (P < 0.001), the null hypothesis was rejected. In other words, the mean score of teachers and students viewpoints was significantly higher than 3. Hence, it can be concluded that the visualization of data could significantly affect the rate of data transfer.

Third hypothesis: It seems that visualization can significantly affect the rate of learning in the students of Virtual Medical School at Shahid Beheshti University of Medical Sciences.

Using *t*-test, the mean score of students and teachers viewpoints towards the effect of data visualization on the rate of learning was compared with the optimal score (> 3). Since the measured mean score was 3.49 and the calculated P value was lower than the considered level (P < 0.001), the null hypothesis was rejected. In other words, the mean score of teachers and students viewpoints was significantly higher than three; hence, it can be concluded that the data visualization could affect the rate of learning.

Fourth hypothesis: It seems that data visualization can significantly affect the ease of access to data in the students of Virtual Medical School at Shahid Beheshti University of Medical Sciences.

The mean score of students and teachers viewpoints towards the effect of data visualization on the ease of access to data was compared with the optimal score (> 3), using *t*-test. Since the measured mean score was 3.50 and the calculated P value was lower than the considered level (P = 0.023), the null hypothesis was rejected. In other words, the mean score of students and teachers viewpoints was significantly higher than 3; hence, it can be concluded that data visualization could significantly affect the ease of access to data.

4. Discussion

Based on the results of students and teachers viewpoints, data visualization had significant and positive effects on virtual medical education; therefore, data visualization with benefitting from technological facilities and different methods helps the students and teachers to benefit from visual strategies in line with fundamental expansion and development of knowledge. Different useful methods of data visualization can play a significant role in the education system in order to improve the process of teaching.

Therefore, it can be said that visualization, particularly its new and effective techniques and technologies, can play a significant role in visual education. Due to lack of physical relationship, actual classes, etc. the students may not understand the provided contents and concepts, properly. If virtual education benefits from visualization methods properly in such a way that students and users can have access to their required resources in the educational websites, such courses sound fruitful and meeting the shortfalls seems rational. Results of the current study were in agreement with those of Doroudi on the application of data visualization techniques and visual literacy in educational activities in order to develop effective techniques of data visualization and support students educational processes. In addition, data visualization preserves technical

data and lets the students express the contents of images, symbols, graphs, and other available data resources, and benefit from effective tools in educational purposes (3).

Students and teachers in the current study showed that all the objectives and aspects of virtual education cannot be met without visualization of data; the better the technical structure of visualization, the higher the rate of data transfer, ease of access to data, learning, and productivity. Although the obtained mean score was at medium upward level regarding virtual education effectiveness, it is hoped that by the improvement and promotion of data visualization techniques, the ascending trend of this development is continued. Moreover, Nikravesh and Jalali in a study concluded that following the electronically compilation of virtual textbooks and anatomy atlases, and putting the provided data at disposal of students via the virtual education system of Deputy Dean (Education) of Mashhad University of Medical Sciences, the access of students to new and applicable references was provided in such a way that significantly increased their ability in scientific competitions (13). The findings were consistent with those of the current study.

The current study results indicated that data visualization could significantly improve the productivity of students of Virtual Medical School at Shahid Beheshti University of Medical Sciences. Of the advantages of virtual education, the increased ability of data storage in the learners seems noteworthy; in this regard, different factors such as vocal and video data, as well as short-interval exams and interaction with the learner and some other factors to re-emphasize purposive learning are also applicable (1, 5). Picturizing reduces the need for education (to explain the data) and causes better presentation of data and consequently, better benefitting from data. By the application of data presentation method, visual processes help the users to have better understanding of the provided data and recover data more desirably (2).

Visualization and use of its new techniques in virtual courses let the students and other users understand data perfectly via benefitting from the websites and other facilities of virtual universities; this trend significantly increases the students' productivity. Kheyrandish in his study indicated that following the advances in information technology and increased penetration of telecommunications into the society, the educational tools and methods are evolved. Evolution in such tools and methods increased the utilization to such an extent that everyone at any specified time and place can start learning (7). Hakimzadeh and Afandideh in a study on 118 M.Sc. student of medical education as well as 11 teachers of the Department of medical education in Tehran University of Medical Sciences. It is revealed that the quality of e-learning course in this department was at a relatively favorable level (15).

Results of the current study indicated that data visualization can significantly affect the increased rate of data transfer in the students of visual medical school at Shahid Beheshti University of Medical Sciences. The use of visualization has had an impact on increasing the speed of the transfer of information to students and users, and as the use of visualization techniques is done correctly, the speed of data transfer to users also increases; this finding was in agreement with that of Liao et al. (10); they established a virtual physics laboratory for school students and reported that using figures, graphs, and formulas with different themes and colors to teach sciences provided an attractive educational environment for the young students associated with quick data transfer (10).

Based on the results of the current study, data visualization could significantly improve the rate of learning in the students of Virtual Medical School at Shahid Beheshti University of Medical Sciences. The current study findings indicated that, owing to the scores of variables, the rate of communication between the image and concept of data, easy and rapid understanding of data, creativity in stimulation of information, the ability to subjective schematization of data, hypothecation based on the visualized data were among the influencing factors. Therefore, it can be explained that the visualization significantly affects and increases the rate of learning in students. When the students receive information in pamphlets as textual files, they may only retain the contents, but if something is presented pictorially or in a particular manner, it is more quickly understood by the student, and consequently, the learning rate increases (3). Results of the current study were in agreement with those of Doroudi and Soleiman Nejad that reported a correlation between rapid understanding of data and data visualization (8).

Finally, results of the current study showed that data visualization can significantly increase ease of access to data in the students of Virtual Medical School at Shahid Beheshti University of Medical Sciences. Data visualization techniques can provide better methods to understand and have access to extensive data spaces (3). An individual engaged in information search system has one or more objective in mind and benefits from the search system as a tool to achieve his/her goals. Therefore, if the virtual education courses employ appropriate and optimal data presentation methods, the student can achieve his/her goals easily with the independence of action; it significantly affects and improves the ease of access to data. These findings were in agreement with those of Keim (9). They concluded that the teachers can acquire their targets by finding a required, particular layout based on the feedbacks and factors associated with services, and also by finding contents for high-performance web-based learning systems.

Based on the results of the current study, it can be said

that the application of visualization techniques plays a significant role in the virtual education. Data visualization results in valuable decision-making, better and faster understanding of environmental changes, discovering emerging opportunities, increasing the power of future prediction, operational budgeting, desirable data interpretation, creating awesome reports, general data observation, saving time, and increasing the productivity. Clarification of data, independence in information seeking, direct and tangible relationship with data, classification of data, and visual understanding of data are among the factors significantly affecting the rate of data transfer. Effective communication, creativity, and hypothesizing are among the important factors affecting the rate of learning. Information-seeking skills, relationship between information sets, ease of access to data in order to improve recognition and data assessment quality are of the advantage of virtual medical course at Shahid Beheshti University of Medical Sciences.

Resources and interactive educational software in virtual education, and the process of presentation help the users to attempt acquiring required data using data visualization software, based on their perceptual abilities. Augmented and virtual reality technologies in medical sciences significantly increased the importance and application of data visualization. Virtual reality is one of the extensive research fields in medical engineering. Not in a distant future, medical education without the application of virtual reality and data visualization is impossible, although there are still some challenges such as lack of technological infrastructures and even lack of enough information in students and teachers about the electronic resources in visualization of data (14).

The related research and practical suggestions are provided as follows:

Owing to the effect of visualization on virtual education, it is recommended that designers and officials be familiarized with modern technologies and employ them in designing scientific-educational resources.

Students and other users involved in virtual education should inform the authorities regarding the information problems and shortcomings in order to prevent the reduction of productivity and performance, and improve utilization.

Designers and compilers of virtual education tools and resources should benefit from the students and teachers' comments and suggestions in order to improve their products.

Visual and media literacy training as well as data visualization educations should be included in the curriculum and educational programs of audiences, learners, and officials of virtual education courses.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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The Role of Technology Acceptance in Predicting Knowledge Sharing Among Students of Shiraz University of Medical Sciences

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Abstract

Background: Today knowledge and information sharing by means of new technologies among university students and faculty members is important. Therefore, it is necessary to identify factors which influence knowledge sharing among university students.
Objectives: The main purpose of the present study was to examine the role of technology acceptance in improving knowledge sharing among students of Shiraz University of Medical Sciences, Shiraz, Iran.
Methods: In this applied research, a descriptive-analytic cross-sectional study was used. The study sample consisted of 228 medical students from Shiraz University of Medical Sciences. The data collection tools included two questionnaires, i.e., technology acceptance (Toe, 2011) and knowledge sharing (Van den Hoof & Van Weenen, 2004) questionnaires. The validity of these scales in terms of form and content was examined by experts in the field, and their reliability was confirmed by measuring Cronbach's alpha coefficients. The reliability of technology acceptance and knowledge sharing questionnaires was 0.83 and 0.72, respectively. After confirming the validity and reliability of the questionnaires, they were distributed among the participants. Finally, the collected data were analyzed using one-sample *t*-test and Pearson's correlation coefficient test in SPSS and structural equation modeling (SEM) in Lisrel 8.8.
Results: The results of one-sample *t*-test showed that the levels of technology acceptance and knowledge sharing were higher than the acceptable level among medical students. In addition, the results of Pearson's correlation test indicated a significant positive relationship between technology acceptance (and its components) and knowledge sharing. In addition, SEM showed that technology acceptance is a significant positive predictor of knowledge sharing among students. Among different components of technology acceptance, only perceived usefulness (PU) and facilitating conditions (FC) were significant predictors of knowledge collecting (P = 0.37 and 0.28, respectively). Nevertheless, other components of technology acceptance could not predict different types of knowledge sharing.
Conclusions: The present results showed that PU and FC could predict the knowledge sharing of students more than other components. To improve knowledge sharing in the context of higher medical education, different aspects of technology acceptance need to be evaluated and expanded; accordingly, establishment of new educational policies is necessary.

Keywords: Knowledge Sharing, Knowledge Donation, Knowledge Collecting, Technology Acceptance, Medical Students

1. Background

Today, universities and higher education institutions play an important role in promoting knowledge generation and sharing among students (1). Knowledge sharing, as one of the knowledge management processes, is considered a challenging and important concept in higher education organizations and can be introduced as the most important organizational resource (2).

Previous studies have reported a significant positive relationship between knowledge sharing and organizational health of employees working in public universities (3). Researchers and academicians have recognized the process of knowledge and information sharing in higher education institutions (4). Therefore, it is necessary to prepare the ground for students to effectively share their knowledge, promote their collaborative learning skills, produce new knowledge, and manage, apply, and share their knowledge (5).

Chin Wei et al. (6) found that structured group activities, collaboration-centered learning, and academic institutions can facilitate the process of knowledge sharing among students. Previous studies have shown that active and willing participation of students in knowledge sharing is the main factor in effective and meaningful learning (7). In addition, this type of involvement can facilitate

academic learning and improve the personal development of students (8). For this reason, some higher education institutions in developed countries receive regular financial budgets for activities concerning knowledge management in universities (2). Considering the significance of this phenomenon, it is necessary to facilitate knowledge sharing among students, especially among medical students whose learning is mostly based on experience, collaboration, and group interaction.

In the knowledge management literature, knowledge sharing has been conceptualized in different ways. Some describe knowledge sharing as active participation in the production of information (9), some define it as shared work experiences of employees in organizations, teams, and classes (10), and some highlight the relationship between different types of knowledge (e.g., intuitive and technical knowledge) (2). Knowledge sharing can help people transfer their knowledge to others so that they can use it to improve their performance (11). Considering the growing significance of knowledge sharing, it is necessary to determine the requirements for success.

Most researchers believe that knowledge sharing takes place when the members of a community are willing to know about the information and skills of others (2). Therefore, internal and external motivators, encouraging people to share their knowledge, should be recognized. Moreover, detailed analysis of the following phenomena is essential: Knowledge sharing barriers; external benefits including economic rewards, promotion, managerial support systems, social rewards with social acclaim, organizational structure, leadership, confidence, networking, and communication (9, 11-13); and internal benefits including satisfaction, self-confidence, high efficacy, learning from experience, and enjoyment (10-13). Overall, these factors can improve the process of knowledge sharing.

As mentioned earlier, to promote knowledge and information sharing at universities and higher education institutions, besides paying adequate attention to the benefits of knowledge, one needs to consider the barriers to knowledge generation. These barriers can be divided into three groups: Personal, organizational, and technological (14). According to previous studies, some of the obstacles in the process of knowledge sharing include: (I) lack of self-confidence, egoism, and special social conditions (15); (II) time-related pressure, superficial relationships, and scientific competition (13, 16); and (III) also insufficient interaction and the students fears of their educational performance can be the obstacles in the process of knowledge sharing.

Unhealthy competition among members of a group can be decreased when there is trust, group work, and a positive outlook towards knowledge sharing (17). It is clear that the positive or negative attitude of people affects the process of knowledge sharing (2, 18). In other words, there is a relationship between people's attitude towards knowledge sharing and performance of knowledge sharing (19, 20). Therefore, it is necessary to find ways through which a positive attitude towards knowledge sharing can be encouraged among university students.

Previous studies have shown that students' realization of the fact that use of different technologies is convenient can directly influence their motivation, attitude, goals, and expectations of the managerial system. In fact, information technology is one of the most important organizational structures, which can affect knowledge sharing. Application of information technology is a major component of the learning process (21). Therefore, implementation of a program for effective knowledge sharing requires the expanded application of modern information technologies. These technologies can decrease temporal and spatial limitations, improve knowledge sharing, and facilitate access to information (2).

Although several studies suggest that communication and information technologies cannot guarantee the success of knowledge sharing (11), some argue that there are various models and methods to describe factors affecting technology acceptance. The model used in the present study was suggested by Teo (22), which is a combination of three models, i.e., technology acceptance model (TAM), theory of planned behavior (TPB), and user acceptance of information technology (UTAUT).

Most researchers believe that TAM can predict technology acceptance by users. According to this model, usefulness and perceived ease of use are the determining factors in technology acceptance. A few years later, TPB (23) was introduced as a model for explaining technology acceptance. According to this theory, attitudes, subjective norms (SN), and behavioral control are the key determining factors in people's goals and behaviors. On the other hand, the UTAUT theory asserts that the user's intentions of using information systems are influenced by four factors, i.e., performance expectancy, efforts expectancy, social influence, and facilitating conditions (FC) (24).

2. Objectives

In light of the above discussion about information technology and knowledge sharing, it can be concluded that knowledge donation and sharing, as major contributing factors in personal and academic success, are influenced by different factors, including attitude towards knowledge sharing, people's intentions and goals, ease of use, and application of information and communication technologies. Although a few studies have been con-

ducted on information technology acceptance and knowledge sharing, the relationship between these two variables has not been yet examined. Therefore, the aim of the present study was to answer the following questions:

I) To what extent are technology acceptance and knowledge sharing practiced by the medical students of Shiraz University of Medical Sciences?

II) Is there a significant relationship between technology acceptance and knowledge sharing among students?

III) Can the components of technology acceptance significantly predict different types of knowledge sharing among students?

3. Methods

Since the aim of the present study was to examine the role of technology acceptance in predicting knowledge-sharing behaviors among medical students of Shiraz University of Medical Sciences, a descriptive correlational design was adopted. The study population consisted of all medical students of Shiraz University of Medical Sciences (n, 950) in 2017. Based on the Morgan's Table, a total of 274 students were recruited in this study.

The researcher-made questionnaires were distributed among the participants in January 2017; the process of data collection was completed in March 2017. Out of 274 students, 228 completed the questionnaires; in other words, almost 83% of the distributed questionnaires were completed. This study was approved by the Ethics Committee of Shiraz University of Medical Sciences. In addition, explanations were given to the participants regarding the study objectives, collection of data, and confidentiality of their personal information.

The data collection tools included the technology acceptance questionnaire (22), which addressed six major issues, i.e., SN, FC, perceived ease of use (PEU), perceived usefulness (PU), attitude towards use (ATU), and behavioral intention to use (BIU) (20 items). This scale was used by Mehdipour et al. (25), Kahrizsangi et al. (26), and Ajam et al. (27), who reported Cronbach's alpha coefficients of 0.80, 0.80, and 0.88, respectively. This scale has been also approved by Venkatesh and Davis (28).

The knowledge sharing questionnaire included two aspects, namely, knowledge donating and knowledge collecting (seven items). The validity of the questionnaires in terms of form and content was assessed by experts, and their reliability was confirmed by measuring Cronbach's alpha coefficients. The reliability of the technology acceptance and knowledge sharing questionnaires was 0.83 and 0.72, respectively. Both questionnaires applied a five-point Likert scale (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree). The questions were intended to evaluate technology acceptance and knowledge sharing. To answer the research questions, we used one-sample *t*-test and Pearson's correlation coefficient test in SPSS version 23, as well as structural equation modeling (SEM) in Lisrel version 8.8.

4. Results

4.1. To What Extent Are Technology Acceptance and Knowledge Sharing Practiced by the Participants?

Table 1 shows the mean and standard deviation of different dimensions of technology acceptance among university students, i.e., FC, SN, PEU, PU, BIU, and ATU. The collected data on technology acceptance show that PU (4.03) and SN (3.43) have the highest and lowest mean values, respectively. In the mean comparison of technology acceptance components and acceptable standards (Q2), one-sample *t*-test showed that the means of all technology acceptance components were higher than the acceptable standards. It can be concluded that the level of technology acceptance among students was higher than the acceptable standard (Table 1).

However, in the mean comparison of technology acceptance components and desirable standards (Q3), one-sample *t*-test showed that only the mean of PU was higher than the desirable level (Table 1). The mean and standard deviation of knowledge donating and knowledge collecting were then compared with the acceptable (Q2) and desirable (Q3) standards.

In the mean comparison of technology acceptance components and acceptable standards (Q2), one-sample *t*-test showed that the means of both knowledge donating and knowledge collecting were higher than the acceptable level. However, in comparison with the desirable standards (Q3), one-sample *t*-test showed that the means of both knowledge donating and knowledge collecting were lower than the desirable level (Table 1).

4.2. Is There a Significant Relationship Between Technology Acceptance and Knowledge Sharing Among the Students?

In the inferential analysis, normal distribution of data was confirmed using nonparametric Kolmogorov-Smirnov test. Then, Pearson's correlation coefficient test was used to examine the relationship between technology acceptance and knowledge sharing. As presented in Table 2, ATU and BIU with a correlation coefficient of 0.60, BIU and PU with a correlation coefficient of 0.42, and PEU and ATU with a correlation coefficient of 0.42 had the most significant correlations. Subjective norm (SN) had the lowest correlation coefficient with other components. In general,

Table 1. Comparison of the Means of Technology Acceptance and Knowledge Sharing Among the Participants

Variables	Mean ± SD	Q2	T Value	Degree of Freedom	Significance Level	Q3	T Value	Significance Level
PU	4.03 ± 0.82	3	18.92	227	00.0	4	0.68	00.0
PEU	3.83 ± 0.77	3	15.90	227	00.0	4	-3.69	00.0
SN	3.43 ± 0.84	3	7.81	227	00.0	4	-10.09	00.0
FC	3.69 ± 0.74	3	13.95	227	00.0	4	-6.18	00.0
ATU	3.80 ± 0.79	3	15.35	227	00.0	4	-3.60	00.0
BIU	3.88 ± 0.76	3	17.48	227	00.0	4	-2.38	00.0
Use of technology	3.77 ± 0.48	3	24.13	227	00.0	4	-6.88	00.0
Knowledge donating	3.97 ± 0.82	3	18.92	227	00.0	4	0.68	00.0
Knowledge collecting	3.02 ± 0.77	3	15.90	227	00.0	4	-3.69	00.0
Knowledge sharing	3.49 ± 0.66	3	11.41	227	00.0	4	-11.45	00.0

Abbreviations: ATU, attitude towards use; BIU, behavioral intention to use; FC, facilitating conditions; PEU, perceived ease of use; PU, perceived usefulness; Q2, acceptable level; Q3, desirable level; SN, subjective norm.

there was a significant positive relationship between technology acceptance and knowledge sharing at an error level of 0.05 ($P < 0.05$, correlation coefficient 0.32).

4.3. Can the Components of Technology Acceptance Significantly Predict Different Types of Knowledge Sharing Among Students?

To test this hypothesis of the study, we used the SEM model. Models 1 and 2 are structural models in the standard estimation mode. According to Figure 1, technology acceptance among the students of Shiraz University of Medical Sciences was a significant positive predictor of knowledge sharing ($\beta = 0.55$). In terms of technology acceptance, PU (load factor = 0.50) could predict knowledge sharing more than other components. In terms of knowledge sharing, knowledge donating (load factor = 0.57) could predict technology acceptance more than knowledge collecting.

In addition, Figure 2 is a structural model for the effect of technology acceptance on different types of knowledge sharing. Among various components of technology acceptance, PC and PU, with the respective significance levels of 37 and 28, were described as significant predictors of knowledge collecting rather than knowledge sharing. Other components of technology acceptance could not predict or determine different types of knowledge sharing.

To calculate the fitness of Figures 1 and 2, Lisrel 8.8 was used. According to expert opinion, v^2/df should be lower than three in an efficient model (29). The goodness-of-fit index (GFI) should be close to 0.90 (30, 31), and adjusted GFI (AGFI) should be above 0.80 (32). In addition, the comparative fit index (CFI) should be above 0.9 in a normal fitness analysis (30, 32, 33), and the root mean square error of approximation (RMESA) should be lower than 0.07 (32, 34). Marsh et al. noted that an efficient model should have the following features: RMESA = 0.8; CFI = 0.95; Tucker-Lewis index (TLI) = 0.95; and standardized root mean square residual (SRMR) = 0.10 (35). Lisrel 8.8 was used to calculate the fitness of Figures 1 and 2. According to Table 3, given the high values of CFI, incremental fit index (IFI), GFI, non-normed fit index (NNFI), NFI, RMSEA, and relative fit index (RFI), the fitness of the model was acceptable.

5. Discussion

To answer the research question regarding the role of technology acceptance in knowledge sharing, we discussed the theoretical underpinnings of these concepts. Then, an analysis was presented in order to determine the factors, which could better predict technology acceptance and knowledge sharing among students. We determined different aspects of technology and communication acceptance, which had greater effects on knowledge sharing among university students, in order to prepare the ground for improving this process. It was found that only PU and FC could significantly predict knowledge collecting, while other components of technology acceptance could not predict knowledge sharing; therefore, PU had a stronger impact in comparison with other factors.

PU refers to a person's perception about the efficacy of a particular form of technology in knowledge sharing. When technologies improve the performance of users, they are perceived to be useful and are therefore used more frequently (36). University students should recognize that they cannot only rely on their own information sources and need to share knowledge with others to save time and improve their learning; therefore, knowledge reception and knowledge sharing should be facilitated.

Table 2. Correlation Between Technology Acceptance and Knowledge Sharing Among Medical Students

Variables	Knowledge Donating	Knowledge Collecting	PU	PEU	SN	FC	ATU	BIU	Use of technology	Knowledge Sharing
Knowledge donating										
Knowledge collecting	0.36[a]									
PU	0.29[a]	0.15[b]								
PEU	0.23[a]	0.11	0.24[a]							
SN	0.12	0.06	0.27[a]	-0.01						
FC	0.30[a]	0.60	0.18[a]	0.30[a]	0.12					
ATU	0.17[a]	0.14[b]	0.35[a]	0.42[a]	0.13	0.16				
BIU	0.21[a]	0.14b	0.42[a]	0.26[a]	0.19[a]	0.16	0.60[a]			
Use of technology	0.36[a]	0.18[a]	0.68[a]	0.58[a]	0.48[a]	0.51[a]	0.72[a]	0.71[a]		
Knowledge sharing	0.79[a]	0.85[a]	0.26[a]	0.20[a]	0.11	0.21[a]	0.18[a]	0.21[a]	0.32[a]	

Abbreviations: ATU, attitude towards use; BIU, behavioral intention to use; FC, facilitating conditions; PEU, perceived ease of use; PU, perceived usefulness; SN, subjective norm.
[a] Correlation is significant at 0.01 (two-tailed).
[b] Correlation is significant at 0.05 (two-tailed).

Table 3. The Significance Level of the Research Models

	Hypothesis	Coefficient (β)	T Significance	Significance	Results
Model 1	Effect of technology acceptance on knowledge sharing	0.55	5.41	< 0.01**	Accept
Model 2					
PU	Knowledge donating	0.09	0.86	> 0.05	Reject
PEU	Knowledge donating	0.10	1.01	> 0.05	Reject
SN	Knowledge donating	0.04	0.46	> 0.05	Reject
FC	Knowledge donating	0.03	0.29	> 0.05	Reject
ATU	Knowledge donating	-0.01	-0.04	> 0.05	Reject
BIU	Knowledge donating	0.01	0.08	> 0.05	Reject
PU	Knowledge collecting	0.28	2.39	< 0.01**	Accept
PEU	Knowledge collecting	0.21	1.79	> 0.05	Reject
SN	Knowledge collecting	0.07	0.82	> 0.05	Reject
FC	Knowledge collecting	0.37	2.94	< 0.01**	Accept
ATU	Knowledge collecting	-0.39	-1.89	> 0.05	Reject
BIU	Knowledge collecting	0.19	1.14	> 0.05	Reject

Abbreviations: ATU, attitude towards use; BIU, behavioral intention to use; FC, facilitating conditions; PEU, perceived ease of use; PU, perceived usefulness; SN, subjective norm.

In addition to PU, FC can also have immense effects on knowledge sharing among students. FC is the degree to which an individual believes that the infrastructure supports the use of a special form of information technology. Overall, when application of a form of technology requires less effort, it will be more widely applied. Therefore, use of up-to-date and easily accessible information technologies should be promoted among students (36).

Organizational factors, social factors, computer features (e.g., hardware and software), training, and group work can all influence a person's perception about the usefulness and easy application of information technologies (37). Chin Wei et al. (6) showed that scientific centers could improve knowledge sharing among university students by concentrating on structured group activities and cooperative learning. In fact, easy communication and sharing leads to an increase in collaborative learning among students and promotes the application of acquired knowl-

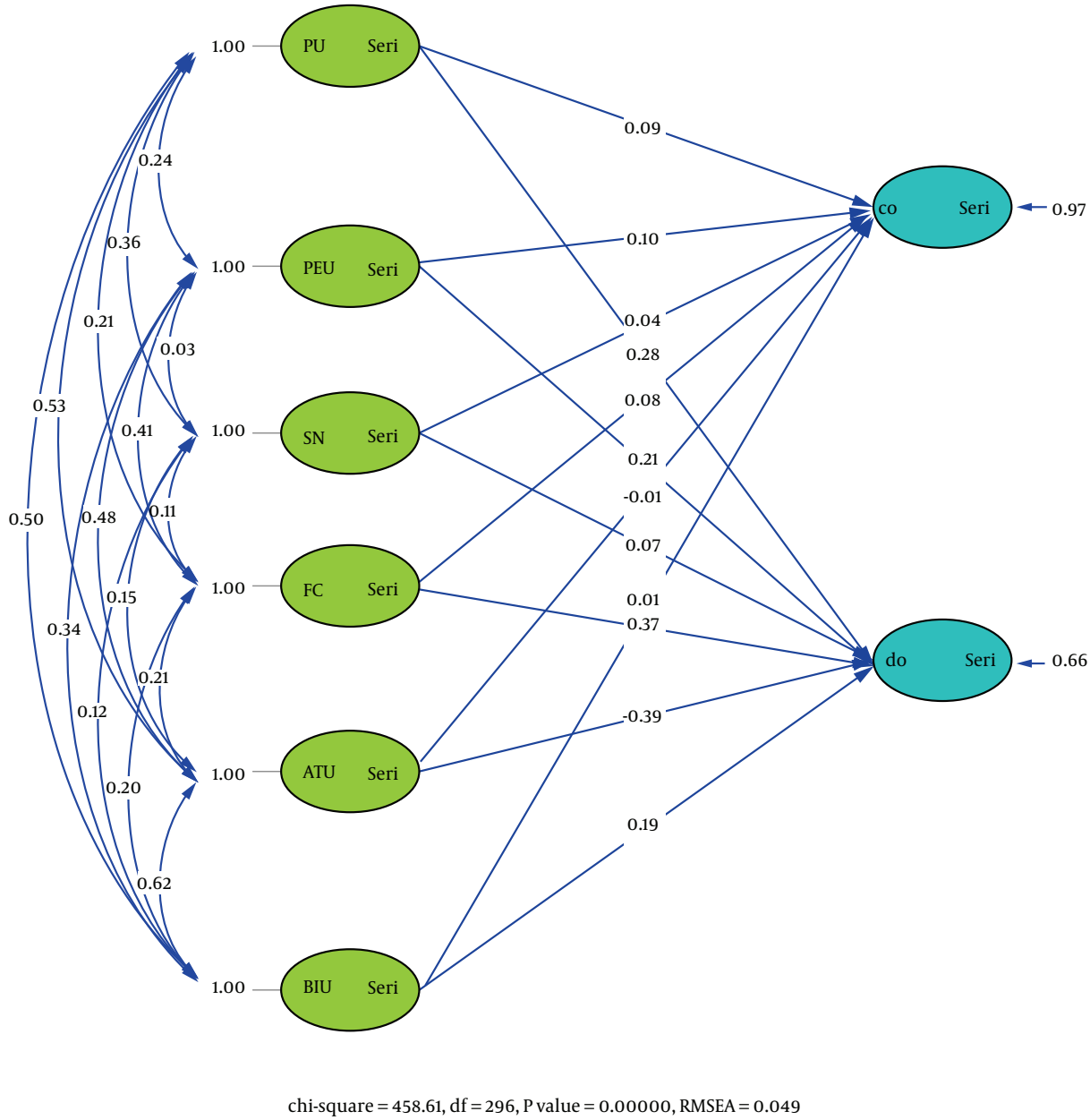

Figure 1. The structural equation model of the effect of technology acceptance on knowledge sharing with standard coefficients

edge. Technologies used in this area encourage a sense of cooperation and knowledge sharing and make the process of learning interesting. Accordingly, selection of efficient technologies in line with the goals of university students can be highly useful in the process of knowledge sharing (37).

In a previous study on the applicability of non-American cultural models and the factors influencing information technology acceptance, it was found that personal attitudes, mental perceptions about the ease of use, and usefulness are the most important factors in the acceptance of information technologies (38). Davis et al. (37) quoted that PU has direct effects on technology acceptance, while it has less significant effects on the acceptance of technology.

In addition to PU and FC, the model of information

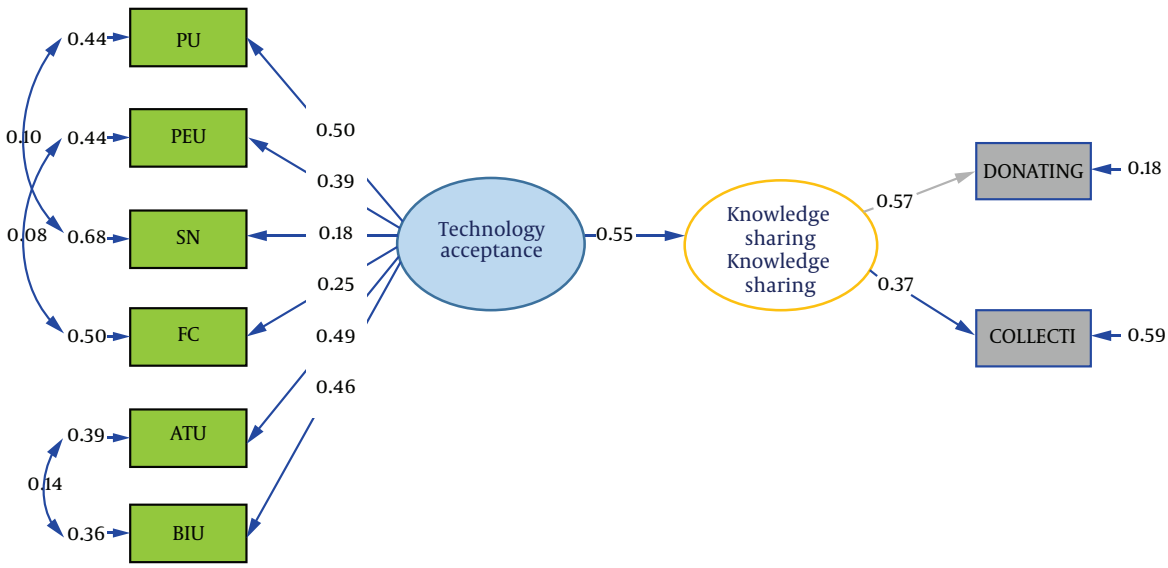

Figure 2. The structural equation model (SEM) for the effect of technology acceptance on different types of knowledge sharing

technology acceptance has other dimensions, including PEU, BIU, ATU, and SN, which do not affect the process of knowledge sharing. Accordingly, certain training courses should be designed to familiarize educationalists and students with different aspects of knowledge sharing and improve the attitudes and perceptions of students towards technology acceptance and knowledge sharing.

According to various studies, there is a significant positive relationship between information technology and knowledge sharing (2, 9, 11, 21, 29, 39, 40). While some previous studies have suggested that information and communication technologies do not guarantee knowledge sharing (9, 11, 41), reported that information technology, networking, and trust have significant positive effects on knowledge transfer and knowledge sharing.

Advancements in information technologies have led to the emergence of new forms of knowledge sharing tools including: Knowledge resources; online networks for direct knowledge sharing; video conferences; peer-to-peer technologies; social networks for indirect knowledge sharing (11); and electronic tools including Emails, online messages, video chats, and online social networks, as well as other electronic tools such as laptops and smart phones (9). Overall, use of electronic tools in virtual networks can foster knowledge sharing and create a community with shared interests, ideas, and wishes directed at solving problems and communication about public issues (40).

It can be claimed that knowledge sharing is not only a goal, but also a means to facilitate organizational processes. The outcomes of knowledge sharing include formation of new knowledge, innovation, and improvement of organizational performance (2). Some studies have suggested that economic success in the future would depend on the ways in which organizations acquire, distribute, and use knowledge. Generally, knowledge is very important for both private and governmental organizations, especially in learning centers such as universities (2).

Knowledge management has become an important strategic resource for creating competitive advantages in organizations (1). Knowledge sharing at universities and higher education centers can improve motivation and strengthen team work among students. This should be especially encouraged in departments of medical sciences, as an important part of medical learning is based on cooperation and knowledge sharing. In fact, modern universities are expected to promote optimal knowledge sharing.

The positive attitude of students towards new technologies and their application can also encourage knowledge-sharing behaviors. However, to achieve this goal, the quality of technologies should be improved, and students' attitudes and behaviors should be corrected so that they allocate more time to these technologies to promote the process of knowledge sharing.

5.1. Conclusions

The main goal of our study was to determine the effect of technology acceptance on predicting knowledge sharing among students of medical sciences at Shiraz University. The results of one-sample *t*-test showed that university students tended to use information technologies for knowledge transfer and knowledge sharing. However, according to one-sample *t*-test university students believed that using technologies for information and knowledge sharing is highly useful. Moreover, the results of Pearson's correlation test showed a significant positive relationship between technology acceptance (and its dimensions) and knowledge sharing ($P < 0.05$). In addition, the SEM results showed that technology acceptance is a significant positive predictor of knowledge sharing among students. Finally, it should be noted that this study was limited to one single university of medical sciences, and therefore, it is difficult to generalize the results. Further comprehensive research is needed on knowledge-sharing behaviors and their effects in institutions of higher medical education.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Authors' Contribution: Ghasem Salimi was responsible for the design of the study, interpretation of the data and critical revision of the manuscript; Mehdi Mohamaddi contributed to analysis and interpretation of the data and drafting of manuscript; Mahboubeh Mehrvarz, contributed to the collection of data, analysis and interpretation of the data and drafting of manuscript; Kamal Hashemi contributed to the collection of data. Finally, all authors read and approved the final manuscript.

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Ethical Considerations: The current study was approved by the Ethics Committee of Shiraz University. The participants were informed about the study goals and involuntary complete the questioners.

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Evaluation of the Effectiveness of In-Service Training Based on the Kirkpatrick Model: A Case Study of a Cardiopulmonary Resuscitation (CPR) Course for Nurses in Afzalipour Hospital, Kerman, Iran

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Abstract

Background: Training of human resources, especially nurses, is a profitable investment for hospitals with major economic return if properly planned and implemented.
Objectives: The present study aimed to evaluate the effectiveness of a cardiopulmonary resuscitation (CPR) course as an in-service training program, based on the Kirkpatrick model.
Methods: This interventional study was conducted at Afzalipour Hospital of Kerman, Iran from October 2014 to May 2015. The study sample consisted of 45 nurses, including 20 nurses in the case group and 25 nurses in the control group. The case group participated in a four-hour CPR training workshop. The Kirkpatrick model was used to determine the effectiveness of the CPR course. Data were collected using three questionnaires and hospital records.
Results: The participants were satisfied with the training course, and a significant difference was observed in the mean score of three intervals of learning levels evaluation ($P < 0.0001$). Based on the findings, CPR training affected the learning level of nurses from the case group; however, the average learning score was not significantly different between the two groups ($P = 0.26$). In addition, the difference in the mean score of behavior level was not significant before and after training ($P = 0.91$). The results of Chi-square test also showed that CPR training did not affect the forth level ($P = 0.54$). Finally, the overall effectiveness of the CPR training course was estimated at 32.51%.
Conclusions: This study indicated that effectiveness of in-service training is not at a desirable level. Since organizations allocate a lot of their resources to such training courses every year, it is essential to reconsider planning and implementation processes.

Keywords: Evaluation, Education Effectiveness, Cardiopulmonary Resuscitation, Kirkpatrick Mode

1. Background

Training and development of human resources is a profitable investment, which can have major economic return for organizations provided if that it is properly planned and implemented (1). Continuous in-service training is a strategy used to deal with uncertain, complex, and dynamic conditions of organizations through upgrading the employees' knowledge and skills which quickly become obsolete (2). The importance of in-service training has been also highlighted for the nursing staff in the past few years (3). In fact, nurses should be familiar with the latest advances in clinical care because of their critical role in patient care (4). Accordingly, hospitals are investing a lot of time and money on nursing training each year (5).

Considering the importance and probable effects of training on organizations, besides the high cost of employee training and development, the effectiveness of educational programs, including nursing training courses, needs to be highlighted and evaluated (6). Despite previous studies on this subject (7-13), different aspects of in-service training remain underexplored, such as effectiveness, evaluation methods, instruments, and time of application (3).

There are controversies about the processes and assessment methods of training effectiveness. Various ap-

proaches and models have been proposed for evaluating the effectiveness of training (11). In this regard, Worthen and Sanders analyzed more than fifty evaluation models (10). Some of these models involve evaluation, while others only present a general view about assessment. These models are formed based on objectives and conditions, fundamental philosophical underpinnings, and certain viewpoints in the definition of evaluation. Each view pertains to certain aspects of evaluation and sets a specific pattern.

Several models have focused on the evaluation of learner's behavior, training materials, or related methods (11). Some models for evaluating the effectiveness of training programs include Kirkpatrick model, Tyler's objective model with a behavioral objectives approach, return on investment (ROI) model, context, input, reaction, and outcome (CIRO) model, success case method, and goal-free evaluation. Overall, selection of a suitable model for evaluation is very important, as different models can present different results (12).

Today, the most common method for the evaluation of training in organizations is the Kirkpatrick's framework, consisting of four levels (13, 14): Reaction, learning, behavior, and results (15). Most previous studies in Iran have not used any specific models or frameworks and only evaluated knowledge (7), skills (8), or both (9, 10) pre- and post-intervention. On the other hand, some studies have applied models, such as Kirkpatrick model, for evaluating training effectiveness at four levels in the health sector (11-13).

Most of the mentioned studies have underlined the level of learning, while only a few have applied a broad approach incorporating higher levels of learning. Overall, effectiveness of nursing training programs remains unexplored when higher levels of the learning hierarchy are taken into account. Therefore, the present study aimed to evaluate the effectiveness of a cardiopulmonary resuscitation (CPR) training program, using the Kirkpatrick model.

2. Objectives

The results of this study can be helpful for managers and planers to promote CPR training courses in the future based on nurses' needs and to improve ROI.

3. Methods

An interventional pretest-posttest design was used to evaluate the effectiveness of the CPR training course among nurses, based on the Kirkpatrick model in Afzalipour Hospital (Kerman, Iran) from October 2014 to May 2015. According to Kirkpatrick's recommendation to incorporate a control group in the effectiveness evaluation of learning, behavior, and results levels (16), nurses were divided into case and control groups of approximately equal size (case group, 20; control group, 25).

The nurses of case group, were required to participate in the CPR course, which was held in form of a four-hour theoretical and practical workshop by experts at Afzalipour Hospital. On the other hand, nurses in the control group did not receive any CPR training; therefore, the learning and behavior levels in this group were only measured once, and there were no pretest-posttest comparisons. The inclusion criterion for nurses in the case and control groups, was lack of participation in a CPR training course in the past months.

The validity of the questionnaires was approved by the faculty members of nursing and emergency experts. The reliability of four-point scale questionnaire of learning level, was down by test-retest (ICC = 0.8). Moreover, to assess the reliability of the Likert scale, Cronbach's alpha coefficient was measured to be 0.92, which confirms the reliability of the questionnaire.

The reaction level was not measured in the control group, as they did not participate in the CPR training course. On the other hand, the reaction level was evaluated in the case group immediately after the training course. The level of learning was measured three times in the case group, i.e., before, immediately after, and six months after the training course, and only once in the control group.

In the case group, the behavior level was evaluated in two intervals: Before the training course and six months after the course (16). On the other hand, the behavior level of the control group was only evaluated once. The number of successful CPR attempts at the hospital was considered as a measure of the results (forth) level. Therefore, the number of successful and unsuccessful CPRs was determined three months before and after training. To measure the total effectiveness score of the CPR training course, we first scaled the scores to 100 and then assigned a relative importance coefficient to each level. The overall effectiveness score was determined by measuring the average effectiveness score, corresponding to the relative importance coefficients.

A questionnaire was completed by each nurse from the case and control groups, containing demographic data, such as age, sex, marital status, educational background, work experience, and information about previous attendance in CPR courses (e.g., instructor and time of the course). In addition, three instruments were designed for evaluating three levels of the Kirkpatrick model.

The first questionnaire was designed to measure the reaction and satisfaction of nurses in the case group about the instructor, content, and amenities of the course. It consisted of 30 questions, scored on a five-point Likert scale, with one representing "strongly disagree" and five representing "strongly agree". The highest score was 150, and the

lowest score was 30; there was no reverse coding.

The second questionnaire measured the knowledge of nurses in both groups with regard to CPR. It included a total of 20 four-option questions. The participants were given one point for each correct response and zero for each incorrect response. The highest score was 20, while the lowest score was zero.

Finally, the third questionnaire aimed to measure the behavioral skills of nurses in both groups with respect to CPR. This questionnaire was completed before the training course and six months after the course in the case group and only once in the control group. It contained a total of 40 questions, scored on a two-point scale. The participants were given zero points for each incorrect response and two points for each correct response regarding the implementation of CPR. The highest possible score was 80, while the lowest score was zero.

After data entry, SPSS version 22 was used to analyze the data, using repeated measures ANOVA and Mann-Whitney test.

Regarding ethical considerations, an official letter was obtained from the Faculty of Management and Information of Kerman University of Medical Sciences, and permission was obtained from the administrators of Afzalipour Hospital for conducting the training course and evaluations. Also, informed consents were collected from the nurses. This study was conducted after explaining the study objectives, ways of collaboration, methods of data collection, and confidentiality of personal information (e.g., name) (ethical code: Ir.kmu.rec.1393.301).

4. Results

Comparison of the case and control groups in terms of individual characteristics showed that the two groups were similar with respect to different characteristics, including age, work experience, gender, marriage, frequency of attendance in CPR courses, educational level, place of service, and history of participation in CPR courses, and no significant difference was observed ($P > 0.05$).

Analysis of the relationship between the demographic characteristics of nurses and the mean scores of training evaluation levels showed the significant correlation of learning and behavior levels with history of participation in CPR courses and frequency of attendance in CPR courses in the case and control groups. Analysis of the reaction level revealed that nurses were very satisfied with the course, and the highest level of satisfaction was attributed to the content of the course (Table 1).

Table 1. The Reaction Level of Nurses in the Case Group

Dimensions	Maximum Score	Mean ± SD
Content	35	31.6 ± 3.47
Instructor	65	54.85 ± 10.54
Amenities	50	34.9 ± 6.24
Total	150	121.35 ± 14.6

The learning level scores of nurses in the case group were 8.5 ± 2.74, 13.45 ± 2.28, and 10.15 ± 1.70 (out of 20) before, immediately after, and six months after the training course, respectively. The difference was significant according to the repeated measures ANOVA ($P < 0.0001$).

Based on the multiple comparisons and repeated measures ANOVA, it was clear that the differences in the scores of learning level were significant before and immediately after the course ($P < 0.0001$), before and six months after the course ($P < 0.0001$), and immediately after and six months after the course ($P = 0.04$). As the findings indicated, CPR training affected the learning level of nurses in the case group (Table 2).

The results of Mann-Whitney test indicated that the mean scores of before the learning level were not significantly different between the two groups ($P = 0.26$). On the other hand, the mean scores of learning level were significantly different between the case group immediately and after the course ($P > 0.0001$) and six months after the course ($P = 0.002$) with the control group (Table 3).

The average scores of behavior level in the case group were 17.05 ± 12.42 and 17.2 ± 12 (out of 80) before and after training, respectively. The results of Wilcoxon test showed that the mean score of behavior level was not significantly different before and after training ($P = 0.91$). In addition, the mean scores of behavior level were not significantly different between the case group before ($P = 0.94$) and after ($P = 0.77$) the course with control group (Table 4).

The results of chi-square test showed that CPR training (number of successful CPRs) was not effective for hospital nurses ($P = 0.54$) (Table 5).

The overall effectiveness score of the CPR training course was 32.51% that illustrated this course was not effectiveness (Table 6).

5. Discussion

The current study aimed to evaluate the effectiveness of a CPR training course among nurses, based on the four evaluation levels of Kirkpatrick model. The results indicated that satisfaction of nurses with the training course was acceptable. The highest level of satisfaction was related to the course content, while the lowest satisfaction was attributed to the course amenities. Our findings met our expectations, as we used the most recent educational content unlike most other courses, and our course incor-

Table 2. Comparison of Learning Level Scores in the Case Group at Three Intervals

Intervals	Mean ± SD	P Value	P Value for Multiple Comparisons		
			First Interval	Second Interval	Third Interval
Before the training course (first interval)	8.5 ± 2.74	< 0.0001	-	< 0.0001	< 0.0001
Immediately after the training course (second interval)	13.45 ± 2.28		-	-	0.04
Six months after the training course (third interval)	10.15 ± 1.7		-	-	-

Table 3. Comparison of Learning Level in the Case and Control Groups[a]

Intervals	Case Group	Control Group	P Value
Learning level before the training course	8.5 ± 2.74	7.4 ± 3.16	0.26
Learning level immediately after the training course	13.45 ± 2.28		< 0.0001
Learning level six months after the training course	10.15 ± 1.70		0.002

[a]Values are expressed as mean ± SD.

Table 4. Comparison of Behavior Level in the Case and Control Groups[a]

Intervals	Case Group	Control Group	P Value
Behavior level before the training course	17.05 ± 12.42	17 ± 13.1	0.94
Behavior level six months after the training course	17.2 ± 12		0.77

[a]Values are expressed as mean ± SD.

Table 5. The Results Level in the Case Group Before and After the Training Course[a]

CPR Performance	Before	After	Total
Successful CPR	16 (25)	17 (21)	33 (22.6)
Unsuccessful CPR	48 (75)	65 (79)	113 (77.4)
Total	64 (100)	82 (100)	146 (100)

[a]Values are expressed as No. (%).

porated practical training, in addition to theoretical education.

In this regard, the results of a study by Alinaghian et al. showed that the participants in the electroshock training course had the highest and lowest levels of satisfaction with the amenities and content of the training course, respectively; these results are reverse with our findings (17). In addition, the results reported by Mohan and Prasad revealed that nurses in the case group had 84% satisfaction with the course instructor in the reaction level, similar to our study (18).

The mean score of learning level showed a significant increase immediately after the course, while it decreased by 17% after six months. This can be explained by the fact that nurses try to pass the evaluation exam only to receive a certificate and discard everything after the course. The results of a study by Mokhtari Nori et al. also showed that the mean score was the lowest before the CPR training course, while the mean score was the highest immediately after the course. Meanwhile, the knowledge score showed a considerable decline two years after the training course (8).

In addition, Mohan and Prasad reported a significant difference in the nurses' knowledge scores before and after the training course, which shows that training was effective and could improve the learning level of nurses (18). Mohamed and Alias in their study showed that the level of awareness and knowledge increased after a training course (19). Moreover, Ghorbanshiroudi et al. (2012) showed that the crisis-management training course was only effective in the learning level (20); similarly, the results of our study confirmed that the CPR training course affects the learning level.

In another study, Borimnejad et al. reported a significant difference in the mean scores between the evaluated intervals (i.e., before, immediately after, and a few months after the CPR workshop). These results indicate that although CPR workshops can meet the needs of nurses to some extent, it is necessary to repeat these workshops at regular intervals (21).

The mean score of behavior level in the case group was very low before the training course and not significantly different from the mean score reported six months after the course. This finding reveals that the behavioral

Table 6. The Total Effectiveness of the CPR Training Course

Levels of Evaluation	Mean Score After the Training Course in the Case Group (Scaled to 100)	Relative Importance Coefficient	Multiplied Percentage Coefficient	Percentage of Overall Effectiveness of CPR Training Course
Reaction	67 ± 10.47	1	67	32.51%
Learning	49.58 ± 9.03	2	99.16	
Behavior	25 ± 12.38	3	75	
Results	21 ± 3.69	4	84	

skill of nurses is very low and has not improved. Also, the level of behavioral skills returned to the initial level after six months, as most CPR training courses held in hospitals are theoretical and do not integrate practical assessment. In fact, nurses showed poor performance in translating knowledge into practice and could not represent their knowledge in their behavioral skills. Based on the findings, the behavior scores were very low before and six months after the training course in both groups; the scores decreased to the baseline after six months.

Moreover, the results of a study by Mokhtari Nori et al. showed that the mean score of knowledge was at the lowest level before the CPR training course; meanwhile, it significantly decreased after two years. The results were similar for practical and theoretical skills, while the score of practical skills significantly decreased after two years (8). The low level of nurses' knowledge and skills in CPR, effectiveness of training in knowledge promotion, and necessity of regular CPR training courses for maintaining the nurses' knowledge and skills are the most important findings reported by Shahrakivahed et al. in 2015 (22), which are in agreement with our results.

A study by Hojjati et al. showed that the overall effectiveness of a training course for nurses based on the Kirkpatrick model was 85.14%, which is significantly different from the overall effectiveness reported in our study (23). In another study, Mollahoseini and Farjad showed that the score of results level in the Kirkpatrick model was 3.06 out of five, which is almost acceptable (20).

In our study, the number of successful CPRs in the case group not only did not increase after the training course, but also showed a 4% decline. This can be explained by the fact that holding CPR training courses could not improve the necessary skills for performing a successful CPR. Therefore, this training course is not effective at the behavior level and is certainly ineffective at the results level. Other possible explanations can be related to the nature of CPR, which is a team-based activity depending on the agility and interactions of team members.

There was a significant relationship between variables, such as history and frequency of participation in CPR training courses, and scores of reaction, learning, and behavior levels. Despite the poor effectiveness of the training course, nurses with a history of participation in training had higher scores in reaction, learning, and behavior levels, compared with other nurses. Therefore, we should increase the number of CPR training courses at hospitals and incorporate the practical aspects. In addition, nurses should exercise CPR using moulage kits to identify their weaknesses; in fact, the internalized CPR skills of nurses will increase the number of successful CPRs in hospitals.

In another study, Bakhsha suggested periodic training of practical skills for the staff (9). The findings of a study by Raeisi et al. also confirm the effectiveness of periodic training, which should be taken into account in the design of short-term and low-cost courses for promoting advanced CPR skills (24). According to the present results, it is necessary to hold such training courses continuously and practically for nurses. It is also recommended to perform a primary evaluation at the behavior level among nurses to identify errors and defects in behaviors and to focus on these issues in practice.

5.1. Conclusions

Based on the present findings, effectiveness of in-service training for nurses is not at a satisfactory level, especially at higher levels of Kirkpatrick model. Therefore, a major revision is necessary in the content and processes of these training courses, as well as the methods of evaluation. Traditionally, on-the-job training focuses on the reaction level for evaluating training courses, which does not seem to be effective. Unless the training and evaluation methods are revised, hospitals will lose their scarce resources by holding training courses without any practical outcomes. Additionally, if hospital managers and planers require up-to-date, creative, and motivated nurses, it is necessary to devise and practice suitable policies considering their prospects; these policies should focus on in-service training for nurses.

It is suggested to incorporate a successful case evaluation model (a qualitative model) and interview nurses, who have successfully applied their learning in the work environment, along with those who have been unable to

apply it in a useful way for some reason; in addition, it is important to determine the factors which are effective or ineffective in training. Considering the importance of evaluating the effectiveness of educational courses for improving their quality, the faculty members of universities or even headquarters should evaluate the effectiveness of training courses at four levels in other sections of Kerman University of Medical Sciences, such as other hospitals.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: The authors declare that they have no conflict of interests.

Ethical Considerations: This study was conducted after explaining the study objectives, ways of collaboration, methods of data collection, and confidentiality of personal information (e.g., name) (ethical code: Ir.kmu.rec.1393.301).

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Comparison of the Effect of Mentorship with a Senior Student or Qualified Nurse on Knowledge and Clinical Self-Efficacy of the Second-Semester Nursing Students

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Abstract

Background: Due to the pivotal role of clinical education in the nursing profession, paying attention to effective approaches in improving the quality of education is of great importance.
Objectives: The current study aimed at determining the effect of mentorship with senior students or nurses on knowledge and clinical self-efficacy of nursing students.
Methods: The current trial was conducted on 72 nursing students in Lorestan University of medical sciences in academic year 2012 - 2013. The participants selected by convenience sampling method and assigned, using stratified random blocks, to one control group which supervised by a faculty member only and two intervention groups supervised by a faculty member and a senior student or nurse as mentor. Clinical self-efficacy scale and a researcher-made questionnaire were used to measure the participants' knowledge and self-efficacy before and after the educational intervention. ANOVA and paired samples *t* test and chi square were used to analyze the data.
Results: The mean score of knowledge and clinical self-efficacy increased in all the three groups, but the increase was significantly higher in the third group (the group supervised by a faculty member and a qualified nurse as mentor) than the others.
Conclusions: Due to the positive effects of mentorship with a qualified nurse, it is suggested that mentorship programs be included in the curriculum of nursing students.

Keywords: Mentorship, Undergraduate, Nursing Students, Knowledge, Self-Efficacy, Clinical Education

1. Background

Clinical experience plays an important role to increase the learning process for nursing students (1), in addition, it is the philosophy of clinical education in nursing to let students acquire the skills and the application of theoretical information in the patient's bedside (2). Therefore, medical education has an essential role in the formation of professional identity to such an extent that it is referred to the heart of professional education (3, 4). One of the great challenges that nursing education has been faced from the past to present, is the theory-practice gap, which caused multitude problems to provide appropriate clinical services. Previous literatures report a far distance between the desirable situation and the current status of the performance of newly graduated nurses (5) which can lead to poor quality of health care (6). In addition, studies conducted in Iran show inefficiency of clinical and theoretical education in nursing (7). On the other hand, all over the world, how to provide high quality clinical education is a major concern for policy makers in nursing education (3).

One of the challenges in clinical nursing education is the teaching style (8). Since bringing up nursing students to successfully transform knowledge into real world role playing is always a challenge in nursing education (9). Therefore, it is expected that the clinical environment to provide opportunities for students to gain useful experiences (10, 11). Today, it is proven that, in clinical practices, students need to have motivated supporters in order to maintain and strengthen learning to such an extent that they become a skilled and competent nurse and play their professional roles, with adequate confidence, (4, 12). On the other hand, the lack of a satisfactory relationship be-

tween the instructor and student as well as formal relationship between students and faculty members in Iran can lead to many complicated matters (13). Anxiety due to clinical complexities affects students' mental activity and reduces their concentration, efficiency, and ability to acquire skills (12). A review of studies in Iran shows many attempts conducted to reduce such stresses. Studies show that the implementation of mentorship program with appropriate surveillance effectively reduce the stressors of clinical environment, anxiety of nursing students, and increase learning motivation (14-17). Also, several studies indicated the effect of peer mentoring or qualified nurse mentoring on students' satisfaction (8, 18-20).

Evidence supports the role of mentorship programs in promoting teaching-learning, counseling, friendship, protection, and coaching processes as well as commitment to professional society (21, 22). In a study by Mahmoudifar, nursing educational program planners were recommended to emphasize on the presence of the instructors and advisors during mentorship in order to guide the students and resolve their educational problems and meet their needs (23). Students' experiences show that lack of a mentor can have a detrimental impact on their sense of belonging as well as learning, and this can clarify the need for alternative structures in the absence of mentors (24). Mentorship means an advanced personal relationship between an individual with a high level of knowledge and experience, and a novice individual in order to be helped (25). The mentor supports students as an advisor and provides them recommendations regarding patient care processes. This educational strategy gives students an opportunity to work with skilled clinical staff (nurses) in a clinical setting, while they are still under the supervision of a faculty member (2, 5).

In recent years, much attention is paid to the peer mentorship model in nursing and it has been known as a useful method to prevent anxiety and confusion, promote active learning, and create an appropriate learning environment (20, 26). In this way, the mentor and mentee are matched by age and the field of education (17, 27). The mentor is a senior student (second- or third-year student) that establishes an intimate and proper relationship with junior (the student under his/her supervision) to give proper advice, counsel, support, information, and feedback for academic achievement (28).

Establishment of a supportive system, especially during the first year of study, and its improvement throughout the clinical education seems necessary (29). In addition, inattention to improve self-efficacy in students in the clinical setting undoubtedly reduces the quality of trained human resources in the nursing profession. Bandura says: "Self-efficacy is one's belief in the ability to perform the desired function and understand to perform a certain task effectively and properly". Self-efficacy is a bridge between knowledge and related professional behaviors. (30). High level of self-efficacy increases students' academic achievement, learning, and participation in student activities (31, 32). Therefore, acquiring knowledge and academic skills is only one of the variables affecting their clinical performance, and teachers should pay attention to other factors such as self-efficacy in students. Therefore, paying attention to the factors such as self-efficacy and trying to improve them, especially in clinical settings, helps to measure the performance of nursing students more accurately (30).

2. Objectives

Since no study was conducted so far on the effect of mentorship program on the clinical self-efficacy and knowledge of the second-semester nursing students in Iran, the current study aimed to investigate the effect of mentorship with a senior student or qualified nurse on knowledge and clinical self-efficacy of the second-semester nursing students.

3. Methods

The current study was an educational trial which conducted on second-semester nursing students who were in the clinical training course (internal medicine ward) in the academic year 2012-2013 in Lorestan University of Medical Sciences, Iran. The inclusion criteria were studying at the second semester of nursing and willingness to participate in the study. The trial was registered at Iranian Registry of Clinical Trials (RCT201201308866N1).

The convenience sampling method was used to select the subjects. To match the study groups according to gender and grade point average (GPA) which may affect the outcome, stratified random blocks (33) used to allocate the participants to three groups. Group A (control group): Supervised by a faculty member only, group B (intervention group): Mentorship with a senior nursing student and a faculty member and group C (intervention group): Mentorship with a qualified nurse and a faculty member. The qualified nurse is referred to a nurse with at least five years of clinical experience. Same contents and procedures were offered in all the three groups.

The clinical self-efficacy scale was completed by the students during mentorship in each group. This instrument had 37 items in four subscales including patient evaluation, diagnosis and planning, implementation and nursing intervention, and health care evaluation which scored

based on a five-point Likert scale (never, rarely, sometimes, most often, and always). The instrument developed by Cheraghi et al., in Iran for nursing students and its validity and reliability has been confirmed (15).

To evaluate effective clinical learning about the contents educated by the mentors or instructors, the level of knowledge about basic nursing skills assessed before and after educational intervention by a researcher-made questionnaire. The questionnaire contained 10 questions on knowledge about nursing care in internal medicine ward. The content and face validity of the questionnaire was approved by five faculty members. All the mentors and instructors attended the briefing session to be informed about the study procedure and training contents.

According to the main objective of the study (comparison of the groups), using the PASS11 software, and considering the power of 0.8 and the significance level of 0.05, equality of the three groups, SD of 10.22 and assumed means of 130, 135 and 140; the sample size of each group was set to 24 and a total of 72.

The mentorship was scheduled in such extent way that during the study, the faculty member, the senior student, and the qualified nurse did not change in order to overcome the impact of behavioral intimidation and training differences of instructors and mentors. ANOVA, paired samples *t* test and chi square were used to analyze the data.

Ethical considerations were observed in the current study; for this purpose, after providing adequate explanations about the importance and objectives of the study, the subjects were assured that they were free to withdraw from the study at any stage.

The personal characteristics of the participants were kept completely confidential at all stages of the study and the results of the study were provided on request. The study protocol was approved by the Ethics Committee of Tehran University of Medical Sciences (ethics approval code: 67657. 200).

4. Results

Of 72 participants, 17 (23.6%) students were male and 55 (76.4%) female. The demographic characteristics of the participants are presented in Table 1 based on the groups. The number of individuals in each group was somewhat equal and there was no statistically significant difference among them (Table 1).

The results of the current study showed that, in all groups, the frequency of the correct answers before intervention was significantly lower than the ones after intervention. The results of paired *t* test showed a significant difference among the groups before and after intervention. In fact, the students' knowledge has been increased by education. Tukey post hoc tests showed that there was a significant difference among the groups. Accordingly, the highest increase in the score was observed; in the third group (C) (mentorship by a qualified nurse accompanied with a faculty member), the second group (B) (mentorship by a senior student accompanied with a faculty member) and the first group (A) (clinical education by a faculty member alone), respectively (Table 2). In the other words, the presence of a qualified nurse as a mentor accompanied with a faculty member for clinical nursing education was more effective to increase the students' knowledge than peer mentorship and/or the faculty member instructor alone.

The results of ANOVA showed there is a significant difference among the groups in the mean score of self-efficacy. According to Tukey post hoc test, the third group (a qualified nurse accompanied with a faculty member) obtained the highest self-efficacy score (Table 2); in the other words, the presence of a qualified nurse as mentor along with the faculty member in the clinical education settings could increase self-reported clinical self-efficacy in students and was much more beneficial than peer mentoring or mentoring with a faculty member alone.

5. Discussion

This study aimed to determine the effect of mentorship programs by a senior student and a qualified nurse on knowledge and clinical self-efficacy of undergraduate nursing students. The results showed an increase in self-reported knowledge in all three groups. In a study by Eller et al. students also stated the communication with mentors may give them the confidence to demonstrate their skills and motivation to use their potential power (34). Bandura pointed out that mentors help students to overcome complicated and difficult challenges which it cause individualized growth also they encourage students to solve their problems and help them to gain more skills, and improve their self-efficacy (35). The results of the study by Myall et al. highlighted the importance mentor's role in the students' prequalifying, and emphasized the need to a mentor with adequate support and readiness (22).

The results of the current study showed that the third group (C), mentorship with a qualified nurse accompanied with a faculty member, obtained significantly higher knowledge and clinical self-efficacy scores than other two groups (A, B), which it indicated the presence of a qualified nurse with a faculty member has more impact on increasing knowledge and undergraduate nursing students' clinical self-efficacy. The results of other studies also confirmed that the mentorship program with a qualified nurse accompanied with faculty member has more positive effects

Table 1. Demographic Characteristics of Participants Based on Groups

Variable	Group A	Group B	Group C	P Value
Gender				0.964[a]
Male	6	5	6	
Female	18	18	19	
GPA				0.984[a]
≥ 15	10	9	10	
≤ 15	14	14	15	
Age, y (mean ± SD)	19.25 ± 1.64	19.13 ± 2.04	19.91 ± 1.51	0.414[b]

[a] χ^2 test.
[b] *t* test.

Table 2. The Comparison of Knowledge and Self-Efficacy Scores According to the Groups and Before/After the Intervention in Each Group[a]

Group	Before, Mean ± SD	After, Mean ± SD	Paired *t* Test	P Value
Knowledge				< 0.001
A	12.07 ± 4.61	14.20 ± 5.76	< 0.001	
B	12.91 ± 5.02	16.11 ± 5.94	< 0.001	
C	11.15 ± 3.81	17.48 ± 6.39	< 0.001	
Self-efficacy				< 0.001
A		128.33 ± 8.91		
B		131.34 ± 9.72		
C		135.71 ± 10.74		

[a] Group A, the control group; groups B and C, the intervention groups.

on improving the clinical practice skills of nursing students compared with clinical education by a faculty member alone. (13, 36) The reason can be explained by that the qualified nurses have the adequate experience in coping with the job-related challenges. Hosseinabadi et al. also confirmed that one of the factors leaded to positive outcomes in their study was the collaboration of clinical nurses in teaching and guiding the students and sharing their knowledge and experiences with students. It seems that using methods that involve the nurses working in clinical settings in the process of students' clinical training can have positive impacts on the promotion of nursing students' clinical education and clinical competency (37).

The second group in which a senior student accompanied with the faculty member, acquired higher scores in knowledge and clinical self-efficacy than the control group. Other studies also confirmed that the students as mentors were preferred, since they had more empathy with younger students (38). The findings of the study by El-Sayed showed the performance score of nursing students who had peer mentorship program (with senior students) was significantly higher than the ones traditionally trained by instructors in clinical education. Students in these groups agreed with the benefits of peer education through both as teaching providers and learners (39). Also, the results of a study by Gilmour et al. indicated the peer mentoring program make to increase the motivation among peers to interact with each other and learning among nursing students (27). Other studies showed the effect of peer mentorship on reducing anxiety and increasing self-esteem in students, which can improve students' learning (14, 16, 40). Also, the results of a study conducted by Asefzadeh et al. indicated the employing the third-year medical students as mentors for the first-year students, from students' perspective, was a satisfactory program (18).

5.1. Limitations

Since the current study examined the clinical self-efficacy of students based on their individual viewpoints, the results may contain participants' inappropriate responses, because people may experience selfishness or selflessness in their self-evaluation, which can be considered as a limitation of this study.

5.2. Conclusions

This study showed the mentorship with a qualified nurse accompanied with a faculty member and then mentorship with a senior student along with a faculty member were more efficient on nursing students' self-reported knowledge and self-efficacy. Although the results of several studies reported the efficacy of both these mentorship methods, no study so far has evaluated and compared these two methods to report the superiority of one over the other. Therefore, it is suggested mentorship programs be applied in nursing clinical education according to organizational and educational infrastructures in Iran.

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Footnotes

Conflict of Interests: None declared.

Ethical Considerations: The study protocol was approved by the Ethics Committee of Lorestan University of Medical Sciences (ethics approval code: 67657. 200).

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Patient Consent: We obtained the informed consent from the participants.

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Published online 2018 December 25. **Brief Report**

The Effect of Interactive and Effective Lecturing Workshop for Developing Faculty Members in Teaching: An Experiment of Utilizing Peer Observation of Teaching and Feedback

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Abstract

Background: Whereas much has been written about the strategies, barriers and facilitator factors of effective and interactive lecturing in medical education little has been written about the effective and interactive lecturing skills educational programs for medical teachers based on peer observation of teaching.
Objectives: The current study aimed at designing and implementing an interactive and effective lecturing workshop using peer observation and feedback, and finally evaluating its results.
Methods: The current descriptive study was conducted in Tehran University of Medical Sciences from 2015 to 2016. The study population consisted of faculty members participating in the effective and interactive lecturing workshop and the study subjects were selected by convenience sampling method. The Kirkpatrick method was used to assess the workshop; for this purpose, the level of reaction, learning, and performance were evaluated using a valid and reliable questionnaire, as well as the one minute note technique, and a form addressing the extent of using interactive techniques in the classroom six months after participation in the workshop. Data were analyzed by using the SPSS 22. Data are presented as frequency and mean where appropriated. The notes were analyzed using manual content analyses.
Results: The participants believed that the workshop could successfully encourage them to use lecturing principles and interactive lecturing techniques, and provide them with the opportunity to practice and rethink the teaching process. The interactive techniques mostly used six months after participation in the workshop belonged to the question and answer (Q& A) techniques, active evaluation, and use of scenario.
Conclusions: It seems that the provision of training opportunities, observation of performance, and giving feedback were effective to improve the quality of empowerment programs. It was suggested that other empowerment programs should also address this point.

Keywords: Faculty, Medical, Feedback, Education, Teaching

1. Background

In recent years, there are a lot of changes in the revision of medical science curricula and shift toward the integration of basic and clinical sciences, but nonetheless, lecturing is still at the forefront of other teaching methods. Because of the bad delivery of lectures, unfortunately they are considered as a 'traditional' form of teaching which are seen without structure that leads passive learning with the newer learning approaches. These problems are not actually related to the nature of a lecture, but because of incorrect use of it and failure to observe its principles (1, 2), since lecturing is the most commonly used teaching method at medical universities (1-3). Although this method is one of the oldest and most widely used methods in medical education, unfortunately today educational experts believe that this useful educational method is not properly applied (3, 4). Problems with teaching methods are among the most important problems always addressed in various evaluations and student surveys; to such an extent that after reviewing most of the curriculum, the dominant teaching method in basic sciences is the interactive lecturing method, which is run with a lot of bugs.

Perhaps one of the reasons for such problems is the

lack of familiarity of professors and the inadequacy or inefficacy of the current methods to empower the faculty members. In many texts, the problems related to proper empowerment of faculty members, lack of motivation, and inadequate attitude toward the employment of various applicable teaching methods are among the most important reasons for not using them (2, 4). In a recent study conducted at Tehran University of Medical School, one of the most important indicators from the viewpoint of faculty members was the problems associated with their empowerment and inadequacy and inappropriateness of available teaching methods (5). On the other hand, most professors often criticize the manners in which the workshops are held, since they do not give them enough opportunity to practice and criticize the performance. After observing these problems, the authors gradually reviewed the existing studies and discussed the way in which the lecturing workshop is organized. To design the workshop, the available literature and the experiences of successful universities were also used (6).

The review of similar studies showed that in various development programs, the improvement of quality of the lecturing method is emphasized. In such programs, a particular attention is also paid to the use of observation, feedback, and rethinking stimulation methods (1). Nasmith and Steinert designed a four-hour workshop to teach interactive lecturing to the faculty members of McGill School of Medicine. The designed program comprised of barriers to interactive lecturing, introduction of interactive lecturing strategies, and providing an opportunity to practice such strategies during the workshop. The results of their evaluation showed that most of the participants considered the workshop useful and after six months they often used interactive lecturing methods in their teaching practice (1).

In a study by Mcleod et al. on the effect of peer observation and feedback using the recorded lectures, it was observed that this method was highly acceptable among participants and led to improved learning. They believed that lecturing skills could be improved by the peer observation and feedback (7). Pattison et al. conducted another study on the empowerment of medical professors teaching skills using peer observation and feedback method in McMaster University. Participants rated the method very useful to enhance their teaching abilities. They also believed that the provided feedback led to a rethinking of their performance (8).

From the totality of studies conducted in this regard it is perceived that the empowerment programs can be effective to expand the employment of active and principled learning methods, but poor empowerment programs that do not provide faculty members with opportunities for practice and feedback cannot provide proper chance of experience for them to practice what they learn (9). Many studies are focused on lecturing, comparing it with active teaching methods and barriers, and facilitators (1), but limited studies are conducted on empowerment programs and describing the experiences gained from peer observation and feedback.

2. Objectives

The current study aimed at describing the experience of Tehran University of Medical Sciences in using the peer observation of teaching and feedback methods to empower faculty members in effective and interactive lecturing, determining their satisfaction with interactive and effective lecturing workshop, and evaluating the outcomes of using interactive lecture techniques.

3. Methods

The current descriptive, cross sectional study was conducted at Tehran University of Medical Sciences from 2015 to 2016. The study was designed, implemented, and evaluated in three stages. The study population consisted of faculty members participating in an effective and interactive lecturing workshop. Subjects were selected using the convenience sampling method.

3.1. Design

In order to design an effective and interactive lecturing workshop, a group of faculty members and qualified students interested in lecturing was formed as the scientific and executive committee of the program. This group included the Director of the Research and Development Center of university, two faculty members interested in teaching with strong proficiency in lecturing, oratorical skills, teaching experience, and one PhD student in medical education with a history of teaching-learning activity and empowering the faculty members. Three two-hour meetings were held to design the workshop. The result of the meetings was the formulation of principles, objectives, method of implementation, and the establishment of the evaluation method.

The workshop should provide an opportunity for professors to give feedback and effectively and interactively practice lecturing.

The workshop should also provide the opportunity of reflection, contemplation, and self-assessment for professors. The program should emphasize on the application of the principles of effective and interactive lecturing, and not only the presentation of theoretical content.

3.2. Performance

3.2.1. Implementation

The program was implemented in three courses as a three-day 20-hour workshop. The first day of the workshop, entitled "effective lecturing", was held with a review of videos of lectures by professors recorded before the workshop. After reviewing the texts related to the lecturing challenges and its benefits, Gagne's nine principles were introduced to streamline the structure of the lecture, and finally, the rhetoric and body language principles were expressed. Subsequently, participants in small groups practiced how to compose a lecture and each of them was given a 10-minute opportunity to present their lectures in order to apply the principles taught at the workshop. During the presentation, all lectures were video recorded by the participants, and then were screened to receive peer feedback, and each of the subjects received feedback in terms of rhetoric skills and lecturing principles. A pre-designed checklist was used to provide feedback. The observation and feedback process is presented in Figure 1.

On the second day of the workshop entitled "interactive lecturing", the adult learning principles were first introduced. Then, 10 interactive lecturing techniques, including "working in small groups, Q& A, quiz, short movies, debating, flashcards, role playing, handouts, scenarios, and learning evaluation", were actively introduced with emphasis on their application in the classroom. Then, subjects in five groups of seven participated in the practice of designing an interactive lecture using such techniques; they presented their lecture within 10 minutes, and then received its feedback.

The third day, entitled "problem students and using software in presentation", began with an engaging lecture on problematic students in the classroom. Then the techniques to manage such problems were expressed. The discussion was managed by the question and answer (Q& A) method. Then, the principles of using Prezi and the slide set were put into practice. At the end, in the small groups, the professors examined their own as well as their peers set slides and provided feedback using a checklist.

Hence, two checklists were used in the workshop to provide feedback. The first checklist was designed to provide feedback to the effective lecturing and the second checklist, to feedback on the slide set. In order to design these checklists, the texts and comments of the scientific committee of the workshop were reviewed.

Checklist of feedback comprised of the principles of lecturing including sound management (tone and volume of voice), speed of speech, making pauses in speech, correct pronunciations, speaking like a common conversation, not formally like reading a book, using the names of the audience, maintain and keep eye contact, cheerful face, the proper use of hand movements, walking all sides of the classroom energetically, well-dressing, smiling at the right time, listening actively to the answers, looking at the audience, not at the screen, presenting the slide contents in brief and the self-language, not just reading the slides. The feedback was given based on the following scale: "He is adequately qualified to perform such skills and does not require additional training; he can perform this skill, but requires more training; he cannot perform this skill and requires much training; the skill is not applicable to present this material and no skill application was observed during the presentation".

The slide set feedback checklist included two parts as contents and template. In the content part, seven, and in the template part, 13 evaluation criteria were included as follows: "The content used is up-to-date; the contents of the slides are scientific and based on recent knowledge; important and applicable information is provided; images, figures, and diagrams are correlated with the content of each slide; figures and diagrams transfer the message perfectly; the reference of each slide is specified if necessary; the order of contents presentation is appropriate in slides (introduction, methodology, results, discussion, and conclusion); it is easy to read the content of the slides; the type of font used is appropriate; the font size used is appropriate (class above 200 students: heading = 42 and body = 36; class under 200 students: heading = 36 and body = 28; class under 50 students: heading = 32 and body = 24); type and size of the font are similar in all headings; type and size of the font are similar in all texts; background and font colors are harmonized; each slide does not contain more than four colors; the color is constant in all slides; the amount of slide content is appropriate (maximum six word in each line and six lines per slide); bulleting is appropriate and does not make perceptional mistakes; title and content of slides are correlated; the ordering of slides is logical and the words and sentences are spelled correctly; grammar rules are observed.' The scale of giving feedback was "excellent, good, satisfying, needs to be improved and incomplete".

3.2.2. Evaluation

The evaluation was performed using the Kirkpatrick model at three levels: "Reaction, learning, and performance" (Figure 2) described in details as follows:

3.2.2.1. Level of Reaction

A valid and reliable (alpha = 0.87) workshop evaluation questionnaire developed at the Department of Empowerment at the Research and Education Development Center of Tehran University of Medical Sciences was used to assess

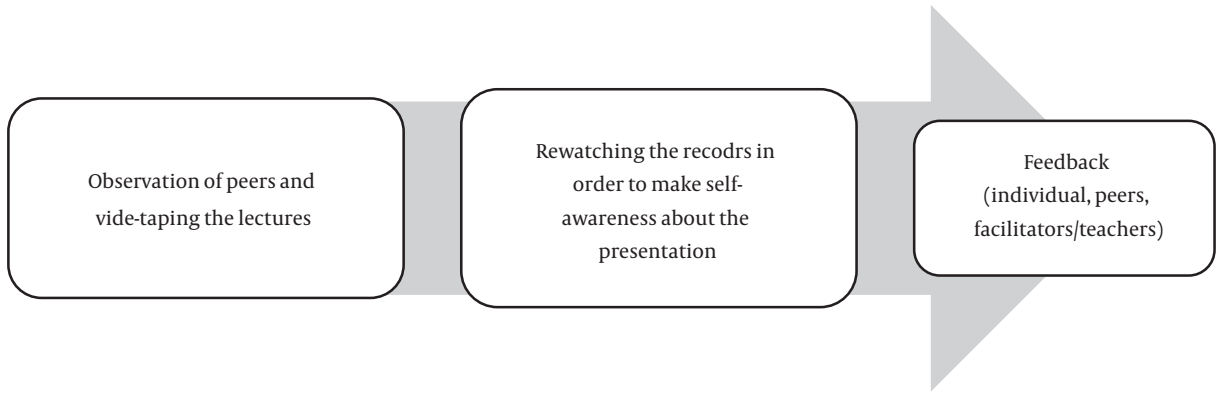

Figure 1. Process of peer observation and feedback at lecturing workshop

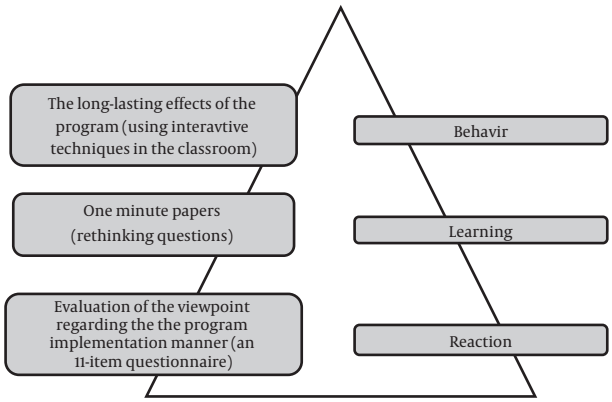

Figure 2. The Kirkpatrick model to evaluate workshop outcomes

the satisfaction of faculty members with the workshop. After obtaining permission from the evaluation unit, the questionnaire was used in the study. The workshop evaluation questionnaire consisted of 11 items scored based on a five-point Likert scale (excellent, good, moderate, weak, and very weak) from 1 to 5. The questionnaire was completed at the end of the workshop personally by each subject.

3.2.2.2. Learning Level

The one-minute note technique was used to assess learning and stimulate the reflection of participants in the program. For this purpose, at the end of each workshop, two questions as "what were you interested in this workshop, and what you learned at this workshop that you use it as a professor in your teaching performance?" were given to the participants. In this technique, which is an active interactive lecturing technique, three main questions were asked: "What was the most important point you learned in today's session? What did you learn at this workshop that you use it as a professor in your teaching performance? What were the unclear points in the lecture?" There is no limitation for the number of questions that can be asked using this technique.

3.2.2.3. Performance Level

At this level, the outcomes of using interactive lecturing techniques were evaluated. For this purpose, six months after the workshop, the viewpoints of the faculty members participating in the program were asked through email to determine the extent to which interactive lecturing techniques were used in their classes. For this purpose, in a designed form, the participants were asked to note in the cell in front of each technique how much each technique was used in their classes within the last six months (number of times). In this regard, out of 140 emails, 64 completed forms were returned and the response rate was 45.71%. Email reminder was also sent to enhance the response rate.

Quantitative data were analyzed with SPSS version 22 (IBM Corporation, Armonk, NY) and one minute note sentences were also analyzed with manual content analysis. Regarding the nature of the data, the frequency (percent) and mean (standard deviation) were used for reporting.

Participation in the current study was completely optional; in addition, participants were free to complete questionnaire. The confidentiality of the names, the publication of the results in general and anonymous collection of information were among the ethical considerations in the study. Oral consent was obtained from all participants. This study was approved by HSR Committee of Education Development Center.

4. Results

Totally, 140 subjects participated in the workshop of which 60 (42.85%) were females and 80 (57.15%) males. The mean age of the participants was 43.56 ± 52.5 years. In terms of academic grade, 112 (80.00%) were assistant professors, 27 (19.28%) associate professors, and one (0.72%) full professor.

4.1. Response Level

Out of 140 participants, 120 completed the evaluation forms. Based on the evaluation results, most of the selected items were "excellent" and "good" (Figure 3).

4.2. Learning Level

Totally, 130 (92.5%) respondents answered the questions. Based on data analysis results by one-minute note technique, the workshop provided a new opportunity for faculty members to practice lecturing, reflect on the process of lecturing, more closely evaluate themselves, receive feedback, practice interaction in speech, and use effective lecturing principles. Participants believed that after participation in this workshop they more often tried using lecturing techniques, spend more time preparing their lectures, recording their speeches from now on, and watching the videos to resolve their weaknesses. Also, they may ask their peers to give feedback and change the educational contents. Table 1 shows an example of participants' statements.

4.3. Level of Performance

A total of 64 (45.71%) subjects responded to this question, and most of them selected Q& A, active evaluation, and use of scenario techniques to determine the mostly employed interactive techniques six months after participation in the workshop (Table 2).

5. Discussion

Due to the importance of using interactive lecturing in large classes and the importance of the empowerment of faculty members in this regard, the current study provided the experience of Tehran University of Medical Sciences in the employment of peer observation and feedback to empower faculty members in effective and interactive lecturing method. The results showed that the employment of peer observation and feedback to performance in empowerment programs along with the use of attractive and applicable topics such as oratory, vocal cords health, and problematic students could have a positive impact on the participants' viewpoints towards the workshop. The finding was consistent with the results of the study by Nasmith and Steinert (1). They believed that the way to hold faculty empowerment programs, in addition to influencing the participants' perspective and expanding the application of interactive and effective lecturing method, can affect the attitude and professional identity of the faculty members (1).

Based on the results of the current study, the content and manner of implementing the workshop was interesting for the participants and stimulated their reflection to use the contents of the program in their teaching practices. Analysis of the results by the one-minute note technique showed that the program could interest the participants to observe teaching and receive feedback from their peers. Today, peer observation and feedback is considered as one of the effective methods to empower medical education faculty members, which is expanding (10, 11). Also, creation of this viewpoint in the faculty members that should assess themselves before making their speeches, in order to make their speeches interactive, and receive feedback of the others are among the most important outcomes of the implemented program, which reflects the stimulation of reflection on the teaching process and a sign of rethinking the teaching style.

In the study by McLeod et al. on the evaluation of the effect of peer observation program on the recorded speeches of professors, the program was highly accepted and led to the promotion of learning (7). Pattison et al. at McMaster University evaluated peer observation and feedback to enhance teaching abilities. Participants in their study believed that the provided feedback led to a rethinking of their professional performance (8), which was consistent with the results of the current study.

It is suggested that further studies should focus on ways to expand the employment of peer observation to enhance the quality of teaching. Also, using standard tools, further studies are suggested to evaluate rethinking as well as its depth in relation to the quality of teaching in faculty members.

Based on the results, among the 10 techniques presented in the workshop, the three techniques of Q& A, scenario, and active evaluation were used more than other techniques. To the authors' best knowledge, one of the limitations of the current study was that no information was found regarding the basic level of the employment of such techniques in the classroom. Perhaps the reason for more employment of such techniques is the familiarity of the faculty members with these methods, since Q& A and evaluation techniques are commonly used in lecture sessions. On the other hand, preconditions should be provided in order to employ some techniques. Therefore, none of the faculty members used flash cards. It seems that more sup-

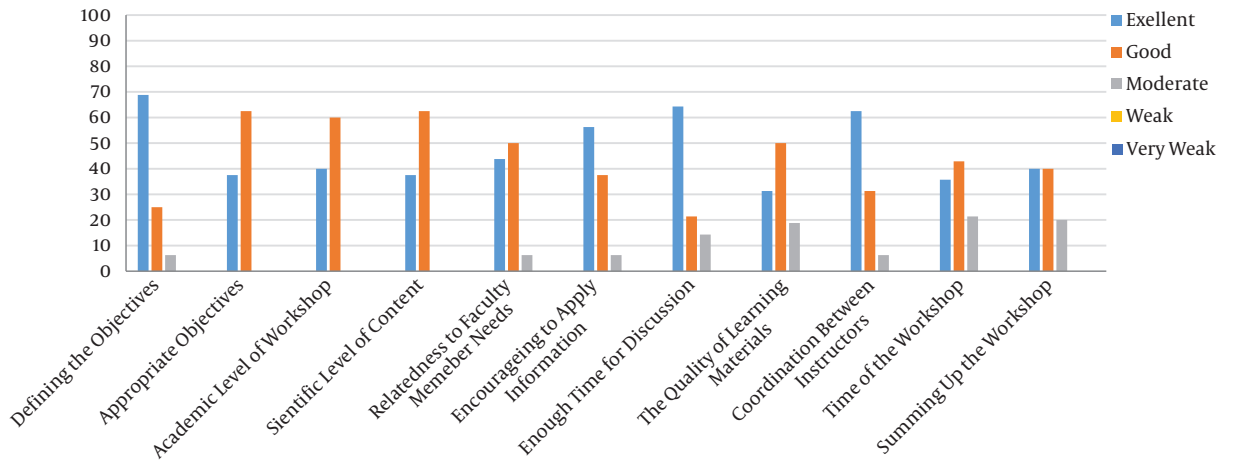

Figure 3. The frequency of participants views about three round of workshop at Tehran University of Medical Sciences

Table 1. An Example of Participants' Statements in Effective and Interactive Lecturing Workshop Based on the One-Minute Note Technique to Assess the Level of Learning and Rethinking Stimulation in Faculty Members

Question	Sample of Answers
What was interesting in this workshop?	
	Problematic students were interesting.
	Vocal cords health was a new topic.
	I had never seen videos of my lectures.
	We have lots of problems …It is what I understand.
	Techniques and their applications were new topics.
	Giving and receiving feedback is difficult, but can be done.
	The workshop was very practical.
What did you learn at this workshop that you will use it as a professor?	
	I try to record more videos from my lectures; there would be many points in them that I have never seen them before.
	I will use interactive techniques such as scenario and debate.
	I will look for receiving feedback, both in class and my slide set …
	I will activate lecture sessions and finish up monopole classes.
	I will revise the contents and offer less content.
	My slideshows should be made from the beginning.
	The lecturing manner would be different in my classes.

port is required to provide physical space and facilities in order to expand the employment of interactive lecturing techniques. Nasmith and Steinert obtained satisfactory results in a similar program in which interactive lecturing barriers and strategies for interactive lecturing were introduced, and the opportunity to practice such strategies was provided during the workshop; according to their results, most of the participants, even after the program, used interactive techniques (1). It is suggested that other studies should also evaluate the impact of such techniques on the improvement of learning in students, and explore if the students are more satisfied with the professors that use interactive techniques? Does the use of such techniques precede the professor's degree of excellence and content expertise? Is it better to use a combination of techniques or any of the techniques separately? And which of such ap-

Table 2. The Mean of Using Interactive Lecturing Techniques by Participants Six Months After Participation in the Workshop

Technique	Mean ± SD	Min.	Max.
Working in small groups	1.3 ± 0.1	0	4
Q& A	8.8 ± 6.2	2	20
Quiz	8.1 ± 4.1	0	5
Scenario	3.2 ± 0.2	0	7
Handout	4.1 ± 1.1	0	4
Role playing	9.1 ± 1.1	0	5
Flashcard	0	0	0
Debating	7.0 ± 4.0	0	2
Movies	9.0 ± 4.0	0	3
Active evaluation	5.4 ± 4.6	0	20

proaches can bring lifelong and deeper learning?

5.1. Conclusion

Based on the results of the current study, it seems that providing opportunities of practice, as well as observing performance and providing feedback can be effective on improving the quality of empowerment programs. Also, employment of empowerment programs using peer observation and feedback can have a positive effect on the satisfaction and learning of participants. It is also recommended that such tips be considered in other empowerment programs.

One of the main limitations of the current study was that the study only described an experience and presented the evaluation results. Therefore, it is suggested comparative methods as well as empirical and interventional researches be employed in further studies in order to examine the actual effects of empowerment programs based on the peer observation and feedback on professional identity, knowledge, and attitudes of the faculty members. The second limitation of the current study was the self-reporting of the participants about the number of techniques used. In this context, more accurate evaluations and measurements are needed to determine the impact of such and other similar programs. Also, the study was conducted only at one university, which restricts the generalization of its results.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

Conflict of Interests: There is no conflict of interest to report.

Ethical Approval: HSR Ethical Committee of Education Develop Center (EDC) of Tehran University of Medical Sciences has approved the study.

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Outpatient Education: An Overlooked Concern in Iran

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Dear Editor,

Patient education involves all activities related to therapeutic instruction, health education, and promoting clinical health, which are intended to enable the patient to make informed decisions about their malady and acquire self-care skills (1). Inpatient education is currently practiced under a regulatory plan to ensure that the patient and his or her significant others are aware of their rights for therapeutic and non-therapeutic services before admission, during hospitalization, and after discharge. Accordingly, through this process, patient satisfaction is achieved and anxiety is controlled (2). However, in outpatient departments, physicians are expected to provide patients and their families with information on the diagnosis and treatment plan; in other words, advice on general risk factors (e.g., quitting smoking, proper nutrition, and physical activity) and specific guidelines (e.g., on types of care, complications, medications, assistive equipment, probable side-effects of the prescribed medications, as well as rehabilitative techniques). Of the utmost importance is the unique and individualized instruction for each patient regarding their specific conditions and likely participation in the treatment plan (3).

In order to educate patients, proper communication is essential, including the allocation of time and proper instruction to encourage them to talk about their current condition, their earlier admission into other medical centers, and their complaints (4). If time is not provided, then patients will only disclose superficial symptoms due to shortage of time, indicating only easily observed signs by the practitioner (3). There is strong evidence that a good patient-doctor relationship affects and enhances patients' adherence to therapeutic regimens. On the other hand, problems in communication are characterized by little allocation of time for patients' comments; less explanation about the causes, diagnosis, and signs of disease; and ignoring patients' emotions. This may lead to inadequate patient education, misunderstanding their emotions, lesser space for family members' role in supporting the healing process, and even occasionally disrespect (5). Traditionally, the patient-doctor relationship is an unhealthy dynamic, with the physician as superior and the patient as subordinate, which is often still the case in Iran (6).

Currently, verbal and written techniques combined with multimedia education are applied for inpatient education by both nurses and doctors; however, outpatient education in day clinics and doctors' offices seems to be missing. The reasons for this may include short visiting sessions, presumption that patients are omniscient, and lack of common knowledge shared with patients. Such impressions prevent doctors from understanding the need to educate their patients. Also, patients disclosing true or false information about their maladies are suppressed with degradation, another sign of issues in doctor-patient communication (5).

Aggravated disease condition, retarded recovery, ignorance of disease conditions, and repeated reference to multiple medical centers are among the outcomes of poor patient-doctor communication and outpatient education (7). In the Iranian context, patients often expend undue costs for ineffective medical records, frequent visits due to symptomatic treatments, improper diagnosis, and partial treatments. In addition, despite certain contraindications, practitioners often prescribe medications that negatively affect specific organs because they have not spent reasonable time accurately exploring and differentially diagnosing the etiology and education requirements of the

patient. For instance, a patient with hepatic disorders suffers from higher levels of liver enzymes, but may be advised to take acetaminophen due to slight pain as his/her chief complaint; unfortunately, this ultimately aggravates his/her hepatic complications.

In short, it seems that despite frequent emphasis on patient education, issues are overlooked in Iran and require scrutiny in different contexts, particularly in day clinics, medical centers, and doctors' offices. Further research may be suggested to understand practitioners' attitudes towards (both literate and illiterate) patients' education and advisability; scientific findings may be gradually integrated into their practice in order to gain patients' active cooperation in the treatment process. Continuing education programs may easily include workshops on the importance of patient education in doctors' offices and medical centers, as well as those on effective communication with patients. Overall, this might be considered an asset in achieving higher levels of health among all members of the society who are admitted, in particular, as outpatients.

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Megatrends of Medical Education and Health Entrepreneurship in the 21st Century

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Dear Editor,

Megatrends represent fundamental social, technological, economic, and political changes, which shape the business environment of the community. The impact of megatrends may persist for decades, regardless of the geographical location. The world is changing rapidly. Indeed, if the changes in the ages of agriculture took a hundred years. The change of industrial age into the information age lasted only two decades.

Therefore, with these rapid changes, we need to predict the future and prepare for it. Medical education is one of the most important ways to achieve sustainable development, as educating individuals for effective social participation is an important developmental goal. Besides its current significance, medical education will remain a priority in the future.

The concept of megatrends was introduced by John Naisbitt in 1982 with the publication of his book on megatrends (1). In brief, megatrends constitute major social, technological, economic, and political changes and have three basic characteristics:

- Megatrends are gradually developed, but their effects persist for almost a quarter of a century.

- Megatrends have an enormous impact on human life.

- Megatrends develop in different regions around the world and are not specific to a particular country or culture, although there may be differences in their magnitude in different places.

Considering the fast pace of global change, nothing is certain except change. Therefore, future analysis of scientific activities is indispensable to our predictions. Education is one of the important megatrends in the healthcare system. In the 20th century, the study of health education was restricted to the influence of medical education on future changes, while in the 21st century, the field of education is considered a megatrend on its own, the effects of which should be evaluated in other areas (2).

Generally, health incorporates different domains, including health facilities, electronic health, modern medical technologies (such as nanotechnology and biotechnology), health services (such as hospital services), public health, mental health, health care, and diagnostic and laboratory services (3). Considering the importance of health, education, and proper academic training, the most important megatrends in medical education are summarized in Table 1.

Table 1. The Top Ten Megatrends in Medical Education

No.	Megatrends
1	Globalization
2	Simulation
3	Increased cost of medical care and medical education
4	Redefinition of ideal medical characteristics
5	Importance of continuous training
6	Incorporation of an interdisciplinary approach and specialized training
7	Understanding medical education as part of health services
8	Need for lifelong education and support for medical professionals
9	Changes in training settings (from hospital to clinics and outpatient treatment centers)
10	Technology

Researchers believe that major changes will occur by 2025, such as acceleration of medical education to three years, clinical time allocation to non-hospital environments, increased attention to community needs, integration of educational systems for training nurses, pharmacists, social workers, and medical students, special attention to community health, and acquisition and application of managerial skills (4). Entrepreneurship can also play a valuable role, as it provides many occupational opportunities and facilitates technological advancements.

In addition, medical education needs to undergo se-

rious changes in accordance with practical work in clinical courses. These fundamental changes can present new ways to develop the students' clinical decision-making capacities through increasing student learning, thereby encouraging independent graduates and creative thinkers. Moreover, instructors should replace new teaching methods with traditional teaching methods for a deeper understanding of entrepreneurship among students (5).

Development of entrepreneurship thinking and behaviors using empirical learning approaches, coupled with E-learning, can lead to the improvement of skills and entrepreneurship in health education. However, some health entrepreneurs claim that university education is only based on traditional teaching methods and does not provide students with sufficient knowledge about entrepreneurship; the main reason for this is the lack of alignment with rapid global changes.

Health entrepreneurs are recognized as business owners, who offer important services in areas such as direct patient care, health education and research, executive work, and counseling. Since entrepreneurship provides an opportunity for identifying and accurately assessing the future of health infrastructure, the young workforce should be encouraged as entrepreneurs in the country (6).

In order to promote the educational process and develop an entrepreneurial mindset in medical education, educational managers of the Ministry of Health should plan future studies in order to promote clinical development and educational excellence. In addition, faculty members can encourage doctoral students to conduct their dissertations in this area. It is also recommended to establish a research committee for continuous monitoring of effective variables in medical education considering the country's priorities and design a new educational curriculum.

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An Introduction to Computer-Based Assessment

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Dear Editor,

With the emergence and progress of the information and communication technology, computer-based assessment (CBA) is considered as an efficient, innovative, and evolutionary assessment method in educational environments to evaluate students' performance compared with conventional paper-based one. Electronic exam is performed by means of an electronic system (computer) and enables the students to access the questions through a computer. One of the main advantages of CBA is the practical improvement of assessment exams, which is not possible in conventional assessment systems (paper-based assessment).

Educational assessment is a fundamental aspect of a teaching and learning process. The purpose of this assessment, as a systematic process, is to collect, analyze, interpret, and evaluate relevant information about students' progress and make judgments in order to achieve the educational objectives. There are many different assessment methods with remarkable influence on the students' performance.

Over the decades, the traditional paper-based assessments (PBAs) are accepted and implemented to achieve the educational objectives in many universities in the world. However, it can sometimes be hard to strategically achieve the real objective of the assessment in view by PBAs. Studies show that the conventional methods of assessment cover the elementary levels of learning (the level of knowledge) (1) and are answer-based and memory-dependent, while in a standard assessment, it is necessary to assess the cognitive and metacognitive levels of students; and the students need to be involved in deeper levels of learning such as analysis, reflective thinking, intuitive thinking, critical thinking, and creativity. Therefore, it is essential to implement new and modern methods instead of conventional ones to assess students' performance.

Today, with the rapid advancement of the information and communication technologies (ICTs) and computer systems, it is better to allow the integration and application of these facilities throughout the educational process that can be taken as an evolution of assessment in the education process. Computer-based assessment recognized as an electronic assessment (e-assessment) or electronic exam (e-exam) is an electronic system that uses ICT technology (1) and allows the students to access the questions of their exams via a computer and provides a chance to assess the students' learning.

The great benefits of the CBAs are as follows: It can be used to conduct various types of questions and improve the quality of questions; it can be presented in various forms such as multiple-choice questions, yes/no questions, true/false questions, short-answer questions, text documents, and multimedia formats such as audio, image, video clips, or in the form of complex simulations.

Some advantages of CBAs, commonly for test questions, include automatic and immediate scoring and feedback, elimination of scoring errors by teachers, test security, reduction of the costs and time (2), transparency of scores, use of computer facilities for calculations, protection of natural resources by removing paper consumption, analysis of the difficulty level of questions, analysis of student performance, etc.

Also, this method provides the ability to use some questions that are not applicable in conventional assessment methods (paper-based assessment). For instance, one of the advantages of this kind of exams is the possibility of using coloured pictures in questions; colour and high-quality pictures play effective roles in the process of answering. One of the challenges that the conventional exams face is the high costs of using colour pictures; on the other hand, black and white pictures do not have an ideal quality and negatively affect the students' answers. This fact imposes some limitations on PBAs when using pictures. Moreover, the possibility of using video or simulation facilitates the process of explaining and demonstrating a question in a real and proper way; although a long text could explain the subject effectively in a conventional exam, it cannot demonstrate the reality precisely as it is.

CBA method also encourages the students to learn their lessons more actively and seriously. In this approach, the assessment exceeds the book-based state and explicit concepts, and hidden curriculum is considered as well.

On the other hand, CBA is still a new phenomenon to assess the students' performance in the university all over the world; therefore, there are some drawbacks to integrate and use this technology in the education systems; for instance, costs associated with providing and equipping the e-exam centers with adequate infrastructural facilities make it difficult to perform a successful CBA administration (these current initiatives) in the education systems (3). Some of the students with poor ICTs knowledge and skill may face a range of problems with the new technology in the examination and need some technical assistance and training. The weak attitudes of some teachers regarding CBAs are also a critical challenge. Technical failures and challenges in case of technology are not unexpected, but it is important to be ready and arrange a back-up procedure and an alternative method for examination in times of emergency. The discussed challenges should be considered by the planners and proctors in order to ideally manage the exams in such a way to maintain this method privileges.

While the application of the PBAs is currently common in educational institutes throughout the world, some universities introduce CBAs as an innovative and essential tool to assess their students' performance. It is quite obvious that in near future, educational environments are moving toward a new digital world. Hence, e-assessment methods need to be supported and invested in the universities and the conventional PBAs should be replaced with CBAs, especially for the new generation of students raised in the modern technology era that are familiar with computer knowledge and skills.

Supplementary Material

Supplementary material(s) is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

Footnotes

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Improving Health Professions Education: The Educational Trinity

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1. Relevance

Health professions education must be relevant to and keep pace with the development of society, in general; being relevant is to provide for new well-trained health care workforce. Quality of training programs must be of the highest possible standard to guarantee safe independent practice. Institutions around the world are constantly struggling to stay relevant. The fast technological development, new drugs, and therapies set a high pace in constantly monitoring and improving educational offerings.

Educational improvement can be analyzed as an educational trinity consisting of curriculum, faculty, and physical space. However, physical space is often neglected, forgotten, and simply not even considered a factor to care about. Nothing could be more wrong. Let me develop this argument.

In the center of the educational trinity have we the individual learners (Figure 1).

Curriculum has many definitions but in an extended meaning, it includes content, how the content is structured (discipline-based, organ-system-based, problem-based, etc.), educational methods, educational technology used, assessment approach, and quality improvement system. In the domain of curriculum, we see currently a massive amount of research and innovation globally (1, 2).

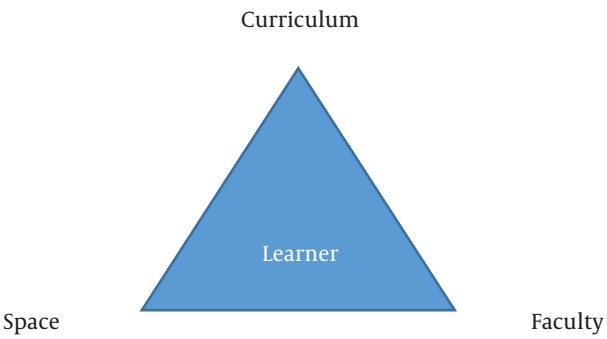

Figure 1. The trinity of educational improvements

Faculty includes the teachers, clinical and non-clinical. Faculty members need to master the content, technologies, and educational methods, as well as understand and apply assessment methods prescribed by the curriculum.

Physical space is the arena within which organized teaching takes place – the front stage of learning. Physical space is also an important arena for the informal interaction between learners – the backstage of learning (3-5).

Efforts to improve education can cause a significant amount of resistance within the faculty. Even after a decision has been made, there are still lots of work to do. Faculty members need to be motivated to implement changes and they need also to understand how to do this in practice. If overlooked, this will cause major implementation gaps between the intended reform and the actual practice (implementation deficits). High-quality faculty development is one remedy for this if properly recognized and properly run (2, 6).

2. New Buildings: Modern Relics from a Past Time

If there is limited awareness of the need for high-quality faculty development, there is almost no awareness of the need for the factor of physical space in educational reform (7, 8). If an institution of health professions education is intended to introduce new educational methods, such as team-based learning or problem-based learning and a flipped approach to learning, this makes significant implications for the design of physical space (8). On a classroom scale, space must be designed so that learners can, for example, see each other in order to discuss. One can perhaps claim that this also works in traditional lecture halls where students are seated into narrow rows facing the lecturer; but without any doubt, it will be much more demanding than in a space designed; so, students can see each other face-to-face rather than face-to-neck. A blended approach with flipped classrooms implies that students have to watch videos and work with materials available online outside their classroom schedules. What physical

spaces do we have to offer students for this requested, but still informal, learning? Where are the social study spaces, apart from, perhaps, some libraries that will be insufficient?

A significant number of medical schools around the world are still built with a "monologue" approach to learning, completely ignorant of current curriculum developments. Social spaces often are completely neglected or designed in a very uninviting, anemic way. Hence, many "new" buildings are in reality nothing else than modern relics of a long past time.

This may have many reasons but to some degree, there is general space blindness in educational improvement (8). Physical space has been seen for a long time as a neutral backdrop, not worth serious attention. There is currently an emerging shift towards a more socio-materialistic approach to space, highlighting the importance of physical space and its part in the educational trinity (9-12).

The pace of educational reform will be even faster in the future driven by improved technology, new biomedical discoveries, drugs, and therapies available. The awareness of the interrelations of the three aspects of curriculum development where physical space has been, and still is, underrecognized must change. The educational trinity is a perspective on educational reform in order to keep us relevant today and tomorrow.

Footnotes

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