

The effect of teaching on team-based learning and group discussion on learning and academic motivation of operating room students in the technology of gastrointestinal surgery lesson

Zahra Aliakbarzadeh Arani^{1,2}, Mahsa Haji Mohammad Hoseini³, Leila Ghanbari Afra⁴, Maede Mohammadzade⁵

Departments of ¹Operating Room and ³Emergency Medicine, School of Paramedical, Qom University of Medical Sciences, ⁴Department of Critical Care Nursing, School of Nursing and Midwifery, Kamkar-Arabniya Hospital, Qom University of Medical Sciences, Qom, ²Department of Gerontology, University of Social Welfare and Rehabilitation Sciences, ⁵Department of Information Technology, Azad University of Tehran, Tehran, Iran

Abstract

Context: Using of varied teaching methods may be effective in motivating to learn better.

Aims: The present study aimed to compare the effect of teaching based on team-based learning (TBL) and group discussion methods on academic motivation and learning of operating room students in the technology of gastrointestinal surgery lesson in Qom University of Medical Sciences.

Settings and Design: This semi-experimental study was conducted among two groups of continuous and discontinuous undergraduate course students of operating room in Qom University of Medical Sciences in 2016–2017. The sampling method was the census. A combination of the TBL method and lecture was conducted randomly among group of continuous undergraduate course students (21 persons) and group discussion among discontinuous undergraduate course students (14 persons).

Material and Methods: Hartler's motivation questionnaire completed by the students at the first and last semesters. The test was also carried out immediately after the end of the term and four months after that.

Statistical Analysis Used: Data were analyzed using frequency, percent, and independent and paired *t*-test in SPSS 13 software.

Results: Comparison of educational motivation score in both groups before and after the intervention was not significant ($P > 0.05$). Academic motivation, after the intervention, was significant in both groups ($P > 0.05$). Comparison of scores did not differ between the two groups immediately after training and 4 months later ($P > 0.05$).

Conclusions: Considering the lack of significant difference between TBL and group discussion in learning and increasing the level of academic motivation of students due to the use of these two methods, it is suggested that TBL and the group discussion replace with the common teaching methods, including lectures.

Keywords: Iran, Learning, Motivation, Teaching method

Address for correspondence: Ms. Mahsa Haji Mohammad Hoseini, Department Emergency Medicine, School of Paramedical, Qom University of Medical Sciences, Qom, Iran.

E-mail: mahsa.nmsprg@gmail.com

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INTRODUCTION

Learning is one of the most important training skills. Learning is a process that ultimately leads to changing the behavior and is the most important way to improve long-term performance.^[1] On the other hand, Zahiri (2009) regards the motivation as the main way of learning.^[2] Motivation in education can effect on learning and behavior of students.^[3] The motivations or instinctive impulses determine the purpose of all activities and provide the stimulus that sustains all mental activities.^[4] The more motivation to study, the more he will be able to work harder to reach the ultimate goal. Reducing academic motivation and academic failure as one of the most important problems in the educational system in countries leads to the loss of many resources.^[5] Effective training is essential in order to increase learning in the fields of knowledge, attitudes, and skills in professional fields, such as medicine. Today, this is why we see the growing expansion of medical science education and its widespread use in training medical students.^[6] Choosing an appropriate educational method is one of the most important measures in the design and implementation of educational programs;^[7] while some traditional and participatory methods have a greater impact on learning, it should be discussed.^[8] Today, various methods of lecture, group training, e-learning, etc., are used in learning.^[9] In recent years, the need for revision of one-way teaching methods and the use of new and activated learning methods by educational systems has been necessary, and the application of these methods has expanded in various sciences, including medical sciences. However, the conventional method of training in universities is a master-based approach. In this method, all the content of the course is expressed only by a speaker (professor), and the student should receive and remember the contents in a ready-to-read way. Although these methods have advantages such as providing a large amount of content in a limited time, their effect (such as lecture) on fostering thought, motivation, and changing attitudes is much less than new educational methods and meaningful and in-depth learning is not created.^[8,9] Therefore, the use of new and alternative educational methods seems necessary because using new teaching methods may improve the more durable, effective, and interest in learning in students.^[10] Researchers believe that the causes of the inefficiency of the university education system are the lack or weakness of governance, attitude, and insight into participatory education.^[11] Teamwork learning experiences are more effective than individual. Teamwork and group learning motivates more learners and creates a positive attitude toward learning experiences and teachers. Educational

psychologists believe that learning becomes better when it becomes more durable and more effective in engaging learning more actively. Therefore, the emphasis is on the use of modern student-based approaches.^[12] Usually, students who are less involved in the discussion in the theoretical classes, in the clinic also communicate less with patients and staff or do not follow the correct principles of communication; they prefer to provide the information that they need from the patient's case.^[13] Different researches have shown that the level of student and workers of organizations as graduate students in teamwork, problem solving, communication skills, and critical thinking is that achieving these skills through innovative learning techniques and an interactive approach, such as problem-based learning, even the most recent team-based learning (TBL) will be possible.^[14] The TBL method is a collaborative learning with a distinct structure that has been experienced in various environments since the 1970s and has been used in teaching health-related subjects.^[15] This method, in addition to providing an active and collaborative learning environment, does not require a small workgroup space and an increase in the number of teachers and can be implemented with a large classroom and a teacher. TBL emphasizes individual and team responsiveness, group engagement, and creating motivation in group discussions.^[16] Ebrahim Invah *et al.* conducted this method at the Sultan Qaboos School of Medicine in Oman. The results of the study showed that using the TBL method has increased the participation of students in the classroom (100% presence). However, in other classes, students' attendance was between 50% and 70%. In addition, this method has led to self-learning among students.^[17] Coles *et al.* said that during those lessons which had been taught as TBL, weaker students showed better performance in the final examinations than before. Teaching as a group discussion is another student-based and active learning method that engages students in educational activities by discussion method and gives them the opportunity to share their views and experiences with others.^[18] Teaching according to group discussion is raised the potential of criticism among learners^[19] increasing individual and social abilities and the potential of perception, thinking, and the persistence of content in the mind.^[20] Although this is a way of improving communication skills, building self-confidence, improving the ability to deliver and clarifying the purpose, strengthening the ability to listen, opposition without resistance and frontier, free expression of comments, and interrogation questions, which sometimes initiates and points, it is also worthwhile to start a research,^[21] more focused on humanity and less on the theory and clinical

teaching of medicine.^[22] Previous studies have shown the effectiveness of group teaching methods in comparison with traditional methods in the country. In the study of Hassanzadeh *et al.*, it has been shown that group learning makes learning deeper and better.^[23] In addition, the clinical skills of the learners were more appropriate and better in another study.^[24] However, the history of this study in the field of surgical technology of undergraduate course of operating room and the comparison of the use of TBL and group discussion is not available. Therefore, this study was conducted to evaluate the effect of teaching on TBL and group discussion in learning and academic motivation of the operating room students in the technology of gastrointestinal surgery, and the results of this study can be used in teaching and educational decisions.

MATERIAL AND METHODS

This article is part of a research project with Ethics Code RI.MUQ.REC.1396.57 from the Ethics Committee of Qom University of Medical Sciences, Iran. This semi-experimental study was conducted among two groups of continuous and discontinuous undergraduate course students of operating room in the unit of gastrointestinal surgery at Qom University of Medical Sciences in the academic year of 2016–2017. The sampling method was the census. In order to calculate the sample size, according to Vaezie *et al.* study, 14 individuals were calculated for each group. The inclusion criteria included the operating room students who received the gastrointestinal surgical technology unit for the first time in the current semester and had a willingness to participate in the study; the exclusion criteria were: "did not cooperate in completing the questionnaires", "more than 3 absentee sessions", "dropping out of school", and "a transition to other universities". In order to provide the framework of the study, the goal of the study was to be discussed at the OR Working Group Council and approved by the group, as well as Education Development Center of Qom University of Medical Sciences. The research and its goals were explained to the participants, and informed consent was obtained from them; the no need to list the names of the participants in the questionnaire was announced. At the beginning of the semester, both the continuous and discontinuous groups were tested for the similar level of information until there were no significant differences between them. After that, a combination of the TBL method and lecture was conducted randomly among a group of continuous undergraduate course students of operating room (21 persons) and group discussion among discontinuous undergraduate course students of operating room (14 persons). Educational content was taught in two groups by teacher except researchers. Students of the TBL

group (continued students) were divided into groups of 5–6 person, according to the attendance list, and each group selected their own secretary and selected the nominees according to their decision. Then, the duties of the secretary, the detailed description of each individual's duties in the team, and mechanism of the method are described in detail; then, the TBL folders contain four quadruple cards, a group list based on the name of each group, appeals sheets and peer review questionnaires and responses delivered to each of the TBL group Secretaries up to bring with themselves in each class session. The content was presented to the students a week before teaching. The individual was test held at the beginning of each session for the TBL group. At this stage, at each TBL session, 8–10 multiple choice questions were designed, and at the beginning of the session, they were asked to complete these questions for about 8–10 min individually, without using the book and other resources. Then, the same team-by-team basis test was performed, and each member discussed the questions and selected a response that was agreed upon by all members as the team's response. The time of this part was about 15 min. After completing this section, the individual questions were read out to the whole group; the groups were notified according to the designed cards (A, B, C, and D), they responded to each question, and the result was inscribed in the group response. The teacher, in this section, was presented the full description of the student's opinion. Those students who were protesting or writing questions could complete the appeal sheet and deliver it to the moderator at the end of the class. Then, according to the context of each session, the teacher designed the scenario which was related to the discussion and set out detailed questions at the highest level of cognitive domain. All groups, in this section, were responded to questions within 20 min. After that, the teacher explained about 30 min of vague or uncovered sections, answering the questions and finalizing them. In the discussion method group, the educational content was already provided to students to prepare for the group discussion in the next class by studying them. In the discussion method group, an individual test was performed at the end of the session after the presentation of the lesson, and the same questions as the TBL group were performed in the same manner and the same mechanism of them; the grades were included. The teacher was in charge of coordinator in both methods, answering the questions and completing the discussion, as well as maintaining the order of the classroom. In order to motivate and participate the students for group activities in the class, 4 final scores were considered as class activities. At the first and last semester, students' academic motivation was compared with Harter's motivation questionnaire in both groups. Furthermore, in order to study the amount of students' learning among

these two methods, after the end of the semester, the final scores of the students of two groups were compared in the technology of gastrointestinal surgery lesson. Four months after the end of the test, the final examination questions of both groups were studied to assess the survival of learning, and the scores were compared between them. The Harter's motivation questionnaire was designed in 1981, which includes 33 items for measuring the internal and external motivation aspects. The inner motivation has subscales of the challenging preference of the curriculum (9 items), focus on curiosity (3 items), the desire for independent domination (5 items), and external motivation, including subscales for easy work preference (6 items), focus on teacher's pleasure (4 items), and dependence on teacher's judgment (6 items). The Likert scale (completely disagree = 1, totally agree = 5) was used for response section. The score of 1 indicates a bad and the rating of 5 is an excellent status. Negative questions (3, 4, 5, 9, 10, 15, 16, 19, 21, 27, and 31) scored in a reverse order. A higher score reflects better academic motivation. The total score of 33–66 is poor, with 66–99 average motivation, and the score which was >99 showed a very good academic motivation.^[25] This questionnaire was valid and reliable in Bohrani study, and the alpha coefficient of Cronbach's internal and external motivation was reported 0.81 and 0.74, respectively.^[18] The confidential code was considered for students, and students could be excluded if they did not want to continue their collaboration. Data analysis was performed, using SPSS 20 (SPSS Inc., IBM). Statistical tests were performed by descriptive and analytical indices such as frequency, percent, and independent and paired *t*-test at a significance level <0.05.

RESULTS

In this study, 35 students (21 students in the continuous undergraduate course according to TBL method and 14 in the discussion group) were participated. In each group, 20% were male and 80% were female. The mean age of participants was 25.66 ± 4.5 . The total academic motivation in the TBL group and the group discussion were 104.58 ± 11.96 and 108.30 ± 11.02 before the intervention, and the total academic motivation score among two groups was 105.94 ± 4.96 and 110.81 ± 11.02 after the intervention, respectively. Independent *t*-test results showed that the comparison of the academic motivation score among two groups before and after the intervention did not have a significant statistical difference [Table 1]. The test scores, immediately after training with TBL method and discussion, were 16.39 ± 3.73 and 15.51 ± 1.99 , respectively. The test scores, 4 months after training, were 9.73 ± 1.83 and 11.32 ± 2.58 , in two groups, respectively. Comparison of scores did not differ between

the two groups immediately after training and 4 months later ($P > 0.05$). Based on the results of paired *t*-test, there was no significant difference in academic motivation before and after the intervention among TBL and discussion groups ($P > 0.05$). Furthermore, the test score, immediately after the intervention, was higher than 4 months after the intervention in both groups, which was statistically significant ($P < 0.001$) [Table 2].

DISCUSSION

Choosing an appropriate teaching method is one of the most important steps in designing and implementing an educational program. Now, the most commonly used teaching method among medical science faculties is lecture method.^[6] In many studies, the lecture method has been compared with new educational methods, including group discussion and TBL.^[1,15,26] Many studies show the different impact of group discussion, TBL, and lectures on increasing the level of learning. Accordingly, this study aimed to compare the effect of these two new educational methods (TBL and group discussion) on the level of learning and academic motivation of the undergraduate course students of operating room on the technology of gastrointestinal lesson. Comparison of the academic motivation score among two groups before and after the intervention did not have a significant statistical difference. Comparison of scores did not differ between the two groups immediately after training and 4 months later. There was no significant difference in academic motivation before and after the intervention among TBL and discussion groups. Furthermore, the test score, immediately after the intervention, was higher than 4 months after the intervention in both groups.

There was no significant difference between the mean of test scores among two groups immediately after training and 4 months later of the study. This means that the use of both methods has been able to improve the level of students' learning. Willett *et al.*, in a study that was in consistent with this study, showed that two methods of learning based on team and learning in small groups led to an increase in the level of veterinary students' learning.^[19] It seems that group or team working and the exchange of information between individuals allows for the transfer of knowledge and experiences and improves the level of learning. On the other hand, in the study by Rastegar *et al.*, students were more active in the team-based method than in lecture, they were participated in discussions and interactions, and the team method led to deep learning among students and improved the performance of them in the final exam.^[1] In Persky and

Table 1: Comparison of academic motivation in both groups before and after the intervention

Variables	Group					
	Before the intervention			After the intervention		
	Mean±SD		P*	Mean±SD		P*
	TBL group	Discussion group		TBL group	Discussion group	
Challenging lesson issues	29.15±5.05	30.20±5.26	0.135	30.05±4.63	33.53±3.4	0.332
Focus on curiosity	9.23±1.26	10±1.3	0.07	9.9±1.48	9.84±1.57	0.913
The tendency to independent domination	17.66±3.13	18.50±2.195	0.423	16.38±2.43	17.64±2.34	0.137
Intrinsic motivation	55.90±6.78	57.90±4.629	0.105	56.36±6.66	62.16±5.16	0.104
Prefer easy practice	21±12.04	20±3	0.772	19.47±2.87	18.42±4.38	0.414
Focus on the teacher's pleasure	12.94±2.09	12.64±2.37	0.699	12.57±2.54	12.28±2.75	0.755
Dependence on teacher's judgment	17.95±3.36	19.28±2.09	0.198	17.50±2.65	17.15±2.7	0.721
Extrinsic motivation	48.94±6.16	52.15±4.96	0.133	49.11±3.73	47.76±6.62	0.478
Total academic motivation	104.58±11.96	108.30±11.02	0.182	105.94±4.96	110.81±11.02	0.48

*Independent t-test. TBL: Team-based learning, SD: Standard deviation

Table 2: Comparison of the motivation before and after the intervention and the score of the test immediately after the intervention and 4 months later in both groups

Variables	Groups (P*)	
	TBL group	Discussion group
Intrinsic motivation before and after the intervention	0.907	0.599
Extrinsic motivation before and after the intervention	0.826	0.031
Total academic motivation before and after the intervention	0.799	0.246
Test scores immediately after the intervention and 4 months later	0.001	0.001

TBL: Team-based learning

Pollack, Beatty *et al.*, Vaezi *et al.*, and Hassanzadeh *et al.* studies, there was a significant difference between the mean scores of students in the team-based approach compared to the lecture.^[6,20,21,23] On the other hand, in the study of Mahram *et al.* and Baghcheghi *et al.*, group discussion method has increased the student's score compared to the lecture method.^[16,26] It seems that in the group discussion method, students have to take careful consideration to the other members' opinions, and on the other hand, they are required to respond in order to accept or reject them. This method provides good conditions for improving the students' communication skills and their level of learning. Individuals use each other's experiences and share ideas. Johnson also believes that peer-to-peer teaching within a group and between groups will increase collaboration, self-esteem, and understanding and thus leads to better learning and promoting diagnostic skills in students.^[24] Differences in sample size, physical space, subject matter, and relevant teacher in different studies can affect the results. The mean score of the test, immediately after the intervention, was higher than 4 months after the intervention in both groups, which was statistically significant. It is clear that over the time, much of the material is forgotten, especially if it is not used; in this study, since the 4-month interval between the two tests is included the semester and the Nowruz

holiday, students during this period of practical work in hospitals did not have a significantly learning reduction rate. In this study, there was no significant difference in the level of motivation in both groups before and after the intervention. It sounds that considering the similar effect of the TBL method and the group discussion on learning in this study, it is expected that there will be the same effect on increasing academic motivation. This study showed that the academic motivation score of two groups of TBL and discussion before and after the intervention were similar and the effect of them on academic motivation was not very clear and the mean of total motivation score among them, after the intervention, shows a little increase. Many studies have examined academic motivation, but there are few studies about the role of teaching method in increasing the level of it. This study did not find a study about the subject of academic motivation and the role of teaching methods in increasing the level of it in Iran. While, one of the most common educational problems in the educational system is the low level of academic motivation among learners, which causes many scientific, cultural, and economic losses to governments and families during a year; the need to study the factors which are affecting the academic motivation makes clear. One of the limitations of this study, which affects the students' academic motivation and consequently their level of learning, is the ambiguity of the future of the operating room field of study as a job, which is outside the control of researchers.

CONCLUSIONS

It is clear that medical science universities always seek to find the best educational methods that increase the level of students' learning and motivation; also, considering the positive effects of team-based training and group discussion on the level of learning that has been proved in many studies, and according to the fact that there is no

significant difference between these two teaching methods in student learning despite the small increase in the level of academic motivation, it is suggested that these two methods replace with the common teaching methods, including lectures.

Conflicts of interest

There are no conflicts of interest.

Authors' contribution

All authors contributed to this research.

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