Team-Based Learning: A New Approach Toward Improving Education

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Abstract- Team-based learning is designed to provide students with both conceptual and procedural knowledge, aiming to enhance active learning and critical thinking. In the present study, team-based learning and lecture methods in teaching the "hospital organization and management" course among hospital management students were compared. This quasi-experimental study was conducted on 25 undergraduate students of management. Teaching sessions were divided into two parts. The first part was taught with interactive lectures and the second part with team-based learning method. The students' knowledge was measured before, immediately and two months (late post-test) after teaching. Finally, the mean scores of the final exam and students' satisfaction towards the methods of teaching were measured. There was an improvement in test scores of the students after the TBL sessions when compared to the test scores after lecture sessions (P<0.001). Also, TBL group had significantly a higher amount of knowledge retention compared to the lecture group (P<0.001), but no significant relationship was found between the mean scores of the final exam in the TBL and lecture groups (P=0.116). Finally, the majority of the respondents were more satisfied with TBL sessions compared to the ones held through lecture (P=0.037). The results indicated that TBL provides a better outcome for students. We found that the TBL approach allowed us to create an active learning environment that contributed to the improvement of the students' performances.

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Keywords: Training methods; Lecture; Team-based learning; Knowledge retention

Introduction

Education is a fast growing field, as almost trainers and instructors use most of the available learning theories to achieve their targets (1). One of the changes we see in medical practice is "less reliance on a particular individual's knowledge base or skill but rather on a team approach" (2). Instructors believe that learning is important as much as training and teaching with different methods is the key to learning (3). One of these methods is team-based learning.

TBL method was originally developed by Michaelsen more than 20 years ago for use in business (4). TBL is a well-defined instructional strategy that is being employed increasingly in medical education. Team-based learning is based on small group interaction. In fact, this method allows a single teacher to manage multiple small groups simultaneously in a large class (5).

Actually, the main learning objective in TBL is beyond simply covering the content (6). The focus of this method is to provide students with the opportunity to practice course concepts during class time (7) .In team teaching, effective learning occurs with the active participation of the learners. This approach helps students to develop intellectual, social and personal features and also pay attention to their previous learning experience (8).

TBL consists of three repeating phases: preparation, application, and assessment. In the preparation phase, students are required to complete an out-of-class reading and then tested at the beginning of the next session. In the application phase, teams of students practice real-world problems within small groups followed by discussion within the class and feedback by faculty members. The final phase is an assessment of students' learning (5).

This study compared lecture and team-based learning methods in students of health care management at Management School of Shiraz University of Medical Sciences

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Materials and Methods

This quasi-experimental study was conducted on 25 undergraduate students at the Management School of Shiraz University of Medical Sciences in 2014. A total of 8 sessions were allocated to teach hospital organization and management course to second-year management students. The first four sessions were taught using the interactive lecture and the remaining 4 sessions by the TBL method. All second-year students of management participated in this study.

Data collection tools were structured pre- and post-test, knowledge retention, final exam and satisfaction questionnaire.

Pre- and post-test of lecture and TBL and knowledge retention questionnaire consisted of 25 multiple choice questions (with a score value for each item). To determinate the Face validity of all the data collection tools, 3 faculty members of management school were polled. After applying corrective feedback, the questionnaire's face validity was confirmed. To determine the reliability, Cronbach's alpha test for all data collection tools was calculated; it confirmed the right internal consistency of the questions in the test (Table 1).

Table 1. The reliability of questionnaire

Test	Cronbach's alpha
Lecture pre-post test	0.85
TBL pre-post test	0.89
Knowledge retention	0.82
Satisfaction toward lecture	0.95
Satisfaction toward TBL	0.87

In the first four sessions, the interactive lecture was used. Each student in the class had a test before and after the lecture sessions. Three weeks later (to mitigate any carry over effect from the lecture), team-based learning sessions were conducted. Pre-TBL test was taken.

In the first phase, which was conducted one week prior to the main TBL sessions, the second year students of the management class were distributed among 5 groups of 5 students each and TBL procedure was explained to them. Each group was given handouts for preparation.

Phase 2

First, the students answered the questions individually using whatever resources they needed (e.g. notes, book); following this, they were instructed to discuss the same questions in their group and provide one set of answers per group. The questions were formulated as multiple choices questions with one correct answer.

Phase 3

Groups of students practiced real-world problems of hospital organization and management cases within small groups followed by discussion within the class and feedback by faculty members. Finally, the students were required to fill out peer evaluation forms for members of their team. Post-TBL test was administered. To check the primary outcome that is knowledge acquisition of hospital organization and management, we checked individual students pre- and post-TBL test score. We also measured the students' knowledge retention 2 months later. Satisfaction of students about TBL, as the secondary outcome, was measured using a questionnaire with 17 items on a three-point Likert scale. Finally, the scores of the final test in course topics which were taught in lecture and TBL groups compared with each other.

The strengths of this study design are learner homogeneity, prevention of observer bias by using a single observer, matching of students taking pre- and post-TBL test and high attrition for comparing the results; independent and paired t-test was used. Statistical analysis was done using the SPSS-18 software at a significance level of $\alpha \leq 0/05$.

Results

Table 2 compares the lecture and TBL groups before and after the intervention. This table shows that there was an improvement in students' post-test scores of after the TBL sessions when compared to the scores after lecture sessions ($P<0.001$).

Table 2. Comparisons of lecture and TBL groups before and after the intervention

Variable	Group		*P*.value
	Lecture mean±SD	TBL mean±SD	
Pre-test	12.00±3.42	12.30±3.09	0.684
Post test	14.72±3.52	19.65±2.44	<0.001
Change	2.72±4.87	7.35±4.17	0.006
***P*.value**	.016	<0.001	--

Table 3 compares the students' knowledge retention, final exams scores, and satisfaction. The TBL group had significantly higher knowledge retention compared to the lecture group ($P<0.001$), but no significant relationship was found between the mean scores of the final exam in the TBL and lecture groups ($P=0.116$). Finally, the majority of the respondents were more

satisfied with TBL sessions compared to lecture (*P*=0.037).

Table 3. Comparison of students' knowledge retention, final exams scores, and satisfaction

Variable	group	mean±SD	*P*.value
Knowledge retention	TBL	18.25±3.34	<0.001
	lecture	12.83±3.50	
Final exam	TBL	16.13±2.48	0.116
	lecture	14.80± 3.61	
Satisfaction	TBL	20.17±3.65	0.037
	lecture	16.68± 6.85	

Discussion

In this study, there was a significant improvement in academic scores in classes taught through TBL method than the lecture method. These results are also consistent with those of other studies in the literature (9-11). There is no consensus as to what would be a suitable choice for studies assessing an active learning method like TBL. Both passive (including lectures) and active methods have been used in the past (4). Some of the reasons cited by students in various studies for improvement in academic scores in TBL method were that this method encouraged them to study regularly, and at the same time they benefitted by actively teaching and learning from peers (11). Most students have noted TBL activities to be more challenging, effective and enjoyable than conventional lectures; they were noted as reasons for their improvement in their academic performance (7,12). The academic improvement of our students could also be due to the fact that in TBL methods students interact with their peers, successfully resolve issues with them, increase their confidence, and their learning is facilitated (13). Also, discussions in the classroom reduce anxiety and increase the students' awareness of their learning process. In this approach, educational opportunities are equally available to everyone, competition turns into friendship, cooperation and partnerships are strengthened, and all-inclusive class is called for thinking and creativity (14). Contrary to this study, however, a similar study reported improvement in scores restricted to some and not all topics (15). Another study by Haidet *et al*., noted no significant difference in knowledge outcomes between TBL method and lectures (16).

In this study, the TBL group had significantly higher knowledge retention compared to lecture group (*P*<0.001). Consistent with our results, several investigators found that cooperative learning approaches using small groups improved retention (17-19). Some of the reasons for long-term retention in the TBL method were that in this method group discussion provides an interaction among the group members. Active learning is a type of learning in which the responsibility for learning is on the learner. During group work, group members have opportunities to experience significant skills such as the ability to ask, explain, cite the example and criticize (20).

There was no significant difference between the mean scores of the final exam in the TBL and lecture groups. In other words, although the TBL group had significantly higher knowledge retention scores compared with the lecture group, because the majority of the students prepare more for final exams, and they just study at night before the exam and use their short-term memory, no significant differences between the mean scores of the final exam in the TBL and lecture group were observed. Consistent with our results, in a study, the introduction of active-learning exercises did not improve the final grades in physical chemistry classes (19), but our result was not consistent with those of other studies (19,21-23). “Exam night students” is not a term; it is a training method that has opened up its place in the country's education system well. In the students, the exam night skill is gradually strengthened, and when he/she enters the university, he/she wonders when the best time to study is. A feature of this method is that the day after the exam, the student forgets all his overnight savings so that after graduation he/she does not even remember the name of the course. The majority of the exam night students confirm this statement and believe that after the test, nothing of the book contents is remembered (24).

In this study, the majority of the respondents were more satisfied with TBL sessions compared to lecture (*P*=0.037) which is consistent with the conclusion reached in several other studies (7,12,22,23,25-29). The majority of students in the present study felt that the TBL session was a better learning strategy which encouraged independent student learning, ensured better content coverage, enabled greater student participation, developed the students' analytical skills and problem-solving, enabled them to learn communication skills, and was more motivating.

In this study, it was not possible to divide the students into two groups of TBL and lecture, and use the same curriculum for them; this was the limitation of the study. Thus, it is recommended that future studies compare these two methods in the peer group with similar educational issues so that conditions are controlled better and provide a more realistic comparison. Overall, this study provides other evidence

on the role and importance of students' active participation in learning that can encourage the use of this method in different courses of study.

The results suggest that TBL provides a better outcome for students. We believe that TBL has been proved to be an effective and highly innovative learning technique in medical courses; we recommend that faculty members should adopt it in their courses; in this way, we can provide our students with more active learning and deeper understanding.

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