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Original Research Paper

Education

TEAM BASED LEARNING AS AN EFFECTIVE INTERACTIVE TEACHING TOOL- A CROSS SECTIONAL COMPARATIVE STUDY

Dr Anuradha Mokkapati

Professor in Microbiology, Telangana Institute of Medical Sciences and Research, Gachibowli, Hyderabad- 500032.

ABSTRACT

Background & objectives: Traditional teaching is passive and also lacks feedback to the students. Active learning methods have gained importance in medical education. Team Based Learning (TBL) promotes active learning among the students, with limited faculty. The objectives of the study were to compare TBL with Traditional teaching method and obtain feedback regarding TBL sessions from the students.

Materials and Methods: Fifth semester students were divided into two groups- Students in A group were included in the TBL session, and those in B group in the traditional tutorial group. An assessment was conducted for both the groups at the end. Feedback was also taken from the students participating in TBL.

Results: Mean score for TBL group was significantly high compared to the traditional tutorial group. Most students opined that TBL promoted active participation and cooperative learning in the students. Many students felt that the session was stressful.

Interpretation & Conclusions: TBL is an active and effective interactive teaching-learning method, which encourages students to work cooperatively.

KEYWORDS : Interactive teaching, Medical education, Team Based Learning, Traditional teaching.

INTRODUCTION

Traditional teaching methods are passive, and also do not give immediate feedback to students, thus leading to low receptivity among the students. Active learning, clinical application and group problem solving have gained importance in medical education (1). They also promote higher cognitive level knowledge, and development of soft skills (2). Problem based learning (PBL), an active learning strategy, has its own limitations being more resource intensive, and requires small student-faculty ratio, which can be difficult in resource limited countries (1). Team Based Learning (TBL), originally developed by Dr Larry K Michaelson in 1979 (to be used in business), is a well defined instructional strategy to promote active learning by the students in resource limited settings, with limited student-faculty ratio (1). In medical teaching, TBL was introduced at Baylor College of Medicine in 2001. The backbone of TBL is self-directed learning. Pre-class preparation gives the learners a foundation, on which they can build connections. As students are familiar with the subject, learning occurs more quickly and actively (3). Team-Based Learning is learner-centered, but instructor-led, and uses a very structured individual and group accountability process, promoting cooperative learning (2). Boon shoft School of Medicine in Wright State University stated in their study that TBL enhances problem solving skills among the students, thus reducing the lecture time. They also stated that TBL ensures student preparedness for the class, and thus creating good energy in the classroom and promoting team work (4).

Following are the essential components to conduct TBL sessions as cited by Nayana K Hashilkar et al (5) in their study:

- **Advanced preparation:** Students require prior preparation to the session, the topic and material required being provided by the instructor.
- **Team formation:** The students should be divided into teams (of 5-7 members each) by the instructor, with varying abilities, background and diversities.
- **Readiness assurance:** The instructor administers a test consisting of multiple choice questions (MCQs) initially to each student (Individual Readiness Assurance Test-IRAT), and then to the teams (Team Readiness Assurance Test-TRAT).
- **Group application exercise:** The instructors provide challenging, application and case scenario based questions in the form of MCQs to the teams, which is followed by extensive whole class discussion regarding their choice of answer.
- **Peer evaluation:** Each student is evaluated by rest of the team members for their contribution to the team's productivity.

With the above background, the objectives of the present study were to:

- Compare TBL with Traditional teaching method.
- Obtain feedback regarding TBL sessions from the students.

MATERIALS & METHODS

The study was conducted in September 2019 at Apollo Institute of Medical Sciences and Research, Hyderabad as a cross sectional comparative study. Approval from the Institutional Research Committee was obtained before starting the study. 108 students in fifth semester were included in the study. Preparatory material was given to the students (on malaria), one week in advance. 100 students attended to the session on the day of study. The session was conducted during a tutorial class, for a topic which was previously covered in the lecture class. The students were divided into two groups – 50 students in group A were included in the TBL session, and 50 students in group B in the traditional tutorial method. Group A was divided into 10 teams, each team consisting of 5 students. On the day of the session, 10 multiple choice questions (MCQs) to test basic level of knowledge were given for the Individual Readiness Assurance Test (IRAT), followed by Team Readiness Assurance Test (TRAT). TBL was conducted for one hour, covering 30 questions. 15 questions were pass-on questions, where the score got reduced if the question passed on to the next team, and 15 questions were MCQs, with four options. The teams which lifted the correct option cards were given full score, while teams not giving a correct answer were not given any score. The teams were given one minute, to discuss among themselves, before they could give the answer. The teams also had to give the reasons why their answer was correct, or even if it was a wrong option. This was done to engage the students in active discussion on the topic, and to give immediate feedback. Faculty added their view points and clarifications at the end to complete the session. For group B, tutorials were conducted in the traditional method, where major role is usually played by the instructor himself. An assessment was conducted for both the groups at the end in the form of four short answer questions (for a total of 20 marks). A feedback was taken from the students participating in TBL at the end on a Likert scale (Table I). A few open ended questions were also given in the feedback to gather students' opinions.

RESULTS

Mean score for TBL group was significantly high (14.61 ± 2.36) compared to the traditional tutorial group (10.23 ± 1.64), which was found to be statistically significant (p- <0.001) (Table II).

Analyzing the feedback given by students, 83% students opined that objectives of the session were clearly explained prior to the study, and 90% said that the content of the reading material given was satisfactory for preparation. Time management of the session was good as opined by 75% students, and 66.66% said that time given for discussion in the team was sufficient. Most students (96.7%) opined that TBL promoted active participation and cooperative learning in the students. Many students felt that the session was stressful (11.66% in the yes category & 70% in the somewhat category. Only 16.66% students said that the session was not stressful.

Following responses were given by students for the open ended questions given in the feedback:

1. What did you like in the session?
- The session was very interactive.
- The session taught us team building skills and how to work in a group, interacting and adjusting with other people, rather than working individually.
- The session taught us the strength and value of team work compared to individual work.
- Working in small groups helped in overcoming hesitation to open up (never could do this in full class previously).

2. Where do you think the session needs to be improved?
- Time management should have been done better.
- The venue for the TBL session should be more spacious

3. For the question as to how often such sessions be conducted, most students stated that they should be conducted once in a month.
4. Other small group teaching methods, students opined to be regularly conducted were- seminars, tutorials, case discussions & demonstrations.

DISCUSSION

The main objective of the present study was to evaluate the effectiveness of Team Based Learning over Traditional teaching. Mean score of TBL was found to be significantly high (14.61 ± 2.36) compared to the traditional tutorial method (10.23 ± 1.64), for a p-value <0.001. In a study by Noreen Rahat Hashmi (1), they reported a high score for their students participating in TBL (4.24 ± 1.41) compared to traditional lecture (2.31 ± 1.36). Nayana et al (5) also reported a significantly greater mean score for students in their TBL sessions (15.33±0.4755) compared to their traditional tutorial group students (13.70±0.4834). Most of the students in the present study opined that TBL promoted active participation and cooperative learning in the students. In a study by Vinicius et al (2), most of their students agreed that TBL sessions were better compared to traditional teaching helped them learn their course better and wanted such sessions to be continued in other phases of the course also. In another study by Nayana et al (5), their students strongly appreciated the group dynamics, team work, and expressed their willingness for continuing TBL for rest of the topics. In another study by Neena Piyush Doshi (3), most of their students opined that the sessions were interactive, well planned and the assessment also well linked to the objectives of the session. Noreen Rahat Hashmi (1) said that their students opined TBL encouraged them to study regularly, and at the same time benefitted them by actively teaching and learning from peers. Many students in the present study said TBL sessions were stressful, probably because they need to prepare for the class properly and should be active all through the class. TBL is not a passive teaching-learning method.

In TBL, the instructor always has the control of content and acts as a facilitator and content expert, which is very important (1). The advantage of TBL is that a single instructor can handle multiple groups in a single classroom, thus making it cost-effective also (4). Vinicius et al (2) have stated in their study that conducting TBL and other active learning methods more frequently helps in moving from the routine memory based learning towards meaningful learning experiences and critical thinking. In order for groups to function as effectively as possible, they should be as diverse as possible.

Preman Rajalingam (7) have reported that they had designed their lecture theaters into team centric large spaces to optimize communication both within and between teams, since they planned to convert all their lecture classes into TBL sessions. They stated that the changes they made in the infrastructure and their commitment for TBL in their curriculum has converted the traditional large space for instruction, to a one providing an engaging environment for active and collaborative learning. They also had introduced Learning Activity Management System which enabled the students to complete the TBL assessments (iRAT, tRAT and application exercises), and also ensured that correct responses were revealed to the student teams at the appropriate time.

Patricia et al (8) stated in their study that the teachers also will have to change their relationship with the students, where they will have to function as a mediator of the autonomous learning process, encouraging knowledge construction and critical judgment in order to fulfill the process. Burgessl et al (9) stated in their study that excelling in communication and team work are essential in health care and patient safety, and the very structure of TBL is very conducive in preparing the students to work in teams, synthesize evidence and communicate with each other.

Citing the advantages of TBL, Neena Piyush Doshi (3) said that the students arriving less prepared in TBL sessions are motivated by two factors to perform better in future sessions- To achieve better grades in the iRAT, and to meet up to their peers' expectations to make valuable contributions to intra-team discussions. She also mentioned that the goal is to equip all the groups with a mix of student characteristics, for example, resourceful students, and students with variable demographic characteristics such as gender and ethnicity so that all groups formed have equal resources, get the opportunity to develop into learning teams, and membership coalition is avoided.

Anass Nuur Ali et al (6) critically evaluated this teaching method and stated that the effectiveness of TBL depends on the willingness of the students to engage them in the session. They also stated that pre-reading for the sessions makes it exhaustive and may lead to loss of motivation in the absence of teaching. The attendance of the students might come down and the students might lose capability to cope over time and in time management. The authors concluded that in addition to appreciation of individual and group benefits of TBL, providing student centered method of learning should not be neglected. They said that a synergistic approach should be used between TBL and traditional learning, which has the potential to increase student satisfaction, boost total scores, and cater to all the students.

Limitations of the present study were that TBL was not conducted for several topics and more number of times, to come to a strong conclusion. The study could be improved in these lines in future.

Table I Feedback questionnaire and responses from students

S No	Question	Yes (%)	Somewhat (%)	No (%)	Do not know (%)

1.	Objectives of the session were clearly defined	83.33	13.33	3.33	--
2.	Content of the pre-reading material was satisfactory	90	6.66	--	3.33
3.	Session started and ended on time	75	16.66	8.33	--
4.	Assessment was limited to the covered topics only	96.66	3.33	--	--
5.	Session promoted active participation of the students	96.66	3.33	--	--
6.	Session promoted cooperative learning of the students	83.33	10	3.33	3.33
7.	Time given for team discussion was sufficient	66.66	21.66	11.66	--
8.	The session was stressful	11.66	70	16.66	1.66

What did you like in the session?
Where do you think the session needs to be improved?
How often (do you think) such sessions should be conducted?
Mention other small group teaching method (you feel) should be regularly conducted.

Table II
Test mean scores obtained

Teaching method	Mean score (total 20)	p- value
Team based learning	14.61 ± 2.36	**<0.001**
Traditional tutorial	10.23 ± 1.64	

CONCLUSIONS

- TBL is an effective small group teaching-learning method in medical education.
- It improves students' prior preparation for the class, and encourages active participation and team building skills.

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