Modified use of team-based learning in an ophthalmology course for fifth-year medical students

Levent Altintas,1 Ozgul Altintas,2 and Yusuf Caglar2
1Department of Medical Education, Medical School, Kocaeli University, Kocaeli, Turkey; and 2Department of Ophthalmology, Medical School, Kocaeli University, Kocaeli, Turkey

Submitted 13 November 2013; accepted in final form 16 December 2013

Altintas L, Altintas O, Caglar Y. Modified use of team-based learning in an ophthalmology course for fifth-year medical students. Adv Physiol Educ 38: 46–48, 2014; doi:10.1152/advan.00129.2013.—Team-based learning (TBL) is an interactive and analytic teaching strategy. TBL is a learner-centered strategy that uses a very structured individual and group accountability process and requires small groups to work together to solve problems. This study served to investigate whether the TBL concept could be modified and adopted to the fifth-year cornea module of an ophthalmology course. Questionnaires (using a Likert scale of 1–5) were distributed to 169 fifth-year medical students attending the cornea module applied as TBL in an ophthalmology course. The questionnaire consisted of two categories: the TBL format (7 items) and an open-ended question about the class (1 item). Feedback was then evaluated. The majority of students felt that modified TBL sessions were better at fulfilling learning objectives (121 students, 71.59%), enabled better understanding (134 students, 79.28%), were more interesting (146 students, 86.39%), ensured greater student participation (123 students, 72.78%), and involved greater effort on the part of students (148 students, 86.39%) compared with traditional teaching methods. Most of the students (129 students, 76.33%) agreed that more such sessions should be organized in the future. In conclusion, after adjustments to improve weaknesses, such as the short time allocation and students’ lack of prior background, the outcomes of this modified TBL approach on the cornea module of an ophthalmology course provide a good basis for its continuation.

How We Teach

CLASSIC TBL

The lecture method continues to be the most commonly used strategy of medical education. The lecture strategy is more teacher centered and discipline based compared with an integrated clinical application method. It is an efficient teaching method that delivers an up-to-date summary of the material from several sources to a student class regardless of size (9). Faculty members commonly collect, evaluate, and synthesize up-to-date information about a topic and prepare handouts for students, who listen during a lecture. Memorizing the underlined information does not mean that students understand the concepts of topic that they will need in practice. It is well known that the development of critical thinking is inversely proportional to the amount of time students spend listening. Retention of the material is poor even when an enriched and focused summary of the topic is given to the student (16).

Approaches used in medical education have been changing, and a variety of new teaching strategies are now used in many schools to promote active learning (3, 17). Many schools have reduced the number of lectures in favor of problem-based learning (PBL) approaches (3, 13). However, despite its advantages, more faculty members and classrooms are needed for PBL to be effectively implemented, so that some universities consider PBL to be too expensive.

Team-based learning (TBL), originally developed by Dr. Larry Michelson, is the newest strategy for business courses (10), and, in the last few years, numerous medical schools have adopted TBL in the delivery of basic sciences (12, 15), clerkships (7, 8), and residency programs (5, 6). TBL advocates self-directed learning of course content and student application of this new knowledge within small collaborative teams and full classroom discussions, thus promoting both low- and high-level learning (1, 4). TBL requires constant student preparation, attendance, and participation and gives students the opportunity to learn from peers as well as how to work and negotiate within a team using features such as self-evaluation and peer evaluation (12).

This study served to investigate whether the TBL concept could be modified and adopted to the fifth-year cornea module of an ophthalmology course. This report describes the content of the modified TBL cornea module in an ophthalmology course, and student’s evaluations will be examined as a basis for improving the class.

METHODS

The presented data are from the academic years of 2010/2011 and 2011/2012. A total of 169 fifth-year medical students were assigned to teams, and 20 team discussions occurred in the cornea module of an ophthalmology course in Kocaeli Medical School. The other modules of the ophthalmology course were conducted using the traditional didactic lecture method.

Classic TBL has four phases, where phase 1 involves out-of-class preparation, phase 2 involves in-class individual readiness assurance tests (IRATs) and group readiness assurance tests, phase 3 involves application exercises that consist of cases in the form of vignettes with a subset of questions related to the case and interteam discussion, and phase 4 involves postclass reflection.

In an academic year, a total of 12 ophthalmology courses, each including 10–15 fifth-year medical students, were completed. A total of 13 classes were allotted to cover general ophthalmology over a period of 3 wk. Each class covers a specific topic. Twelve of these classes were conducted using the traditional didactic lecture method. One class, the cornea module, was conducted using the modified TBL method.

In the beginning of the ophthalmology course, the modified TBL procedure and grading system were explained to the students. The cornea module has 10% of the grade of the whole ophthalmology course. Cornea module grades were determined as follows: 50% final examination score, 25% IRAT evaluation, and 25% team readiness assurance test (TRAT) evaluation. We assigned readings from the required textbooks and list of references and created the learning objectives. Phase 1 occurred before the TBL session and was completed by each student individually. Phases 2 and 3 occurred during
the class and involved the individual student, teams, and the entire class and were conducted at the end of the second week of the ophthalmology course. Phase 2 began with the IRAT with four case histories (numbered 1–4), each with five related questions, and six questions covering the topic, which each student had to answer on their own (15 min). Answer sheets were collected after each unit. Students in the course were then divided into teams of five to seven members (with two or three teams in each course). To prevent students from organizing themselves into preexisting subgroups, the instructor (O. Altintas) formed the teams randomly. The team, as a group, retook the same exam (30 min) and selected one common answer for each question. This process was called the TRAT. The team discussion provided opportunities for peer teaching and collaborative problem solving. In this part, students were free to use materials from the handout, textbooks, and even the internet with any other source as reference material to help them to answer the question and provide a defense of their response. During the team discussions, the instructor circulated the classroom to observe the team discussions, clarified microconceptions, answered questions, promoted engagement in the discussion, and provide feedback to help students in their approach to the case. After the IRAT and TRAT were completed, the instructor discussed the answers with the whole class and clarified any concepts that students did not understand. Since the quizzes were case based, we did not use phase 3 (application exercise) of the classical TBL approach.

At the end of the TBL exercise, students were required to complete a peer assessment of each team member’s contribution to counseling students who received low scores from peers for internal use only. A survey using a series of five-point Likert-scale questions was administered to gather feedback from the students at the end of the course. The questionnaire consisted of two categories: the TBL format (7 items) and an open-ended question about the class (1 item). These items are shown in Table 1. Answers to the open-ended question also shown in Table 1.

RESULTS

Overall, 169 students responded to the questionnaire. The responses to each statement are shown in Table 1. The majority of the students (71.59%) felt that the modified TBL sessions were better at fulfilling the learning objectives. Most of the students (79.28% and 86.39%) felt that the modified TBL method enabled a better understanding of the subject and was more interesting than traditional lectures, respectively. Most of the students (72% and 87.5%) also thought that the modified TBL sessions enabled more student participation and involved greater effort on the part of students compared with the traditional method. Students (76%) thought that more such modified TBL sessions should be conducted in the future.

One hundred thirty-two of the students (78.1%) offered their comments or suggestions regarding these TBL sessions. Most of them (125 students, 95%) felt that this method was good and that they were satisfied with the content of the course. Thirty-three students (25%) were relatively dissatisfied with the amount of time that they were supposed to be prepared for the class, but most of the students (119 students, 90%) felt that they were given enough time to prepare for these sessions. Students (126 students, 96%) reported an increase in workload due to preparation for the TBL format but less work load before the examination. Even though most students (109 students, 83%) responded that many more TBL sessions should be conducted in the future, they commented that traditional lectures may be required for certain topics that were difficult to understand. Other students comments can be summarized as follows: “the TBL format was useful.” “I easily learned the topic,” and “we spend more time with the instructor.”

DISCUSSION

In the present study, we have presented the results of a pilot study that summarizes our approach of using a modified TBL method instead of the traditional lecture method on the cornea module of an ophthalmology course.

TBL is completely different from traditional educational approaches. The didactic presentations in the lecture method provide an up-to-date summary of the topic from several sources as well as an expert to simplify and deliver a complex concept to novices (14). This is also an economic method for pacing the work rate of a large body of learners (2). The main drawbacks of the lecture method are the passive nature of the audience and the limited opportunity for feedback and real-world problems that need synthesis and analysis, which are used to challenge the student’s thinking (7a). A recent report by Swanson and Anderson (18) has defined the need for a system of medical education that fostered students’ skills and attitudes that would help them become lifelong learners. The change involved a reduction in lecture hours and teacher-centered strategies. The importance of teaching methods that promote active learning and critical thinking have been well recognized. While PBL has been previously introduced and has been well studied, TBL is the new strategy used mainly in preclinical periods of medical education (12, 15). We consider that our approach using TBL in an ophthalmology course is unique in that the modification allowed us to remove the cornea lecture and incorporated “learning issues” for students to work as a team in learning corneal diseases and trauma. The results of this study showed that TBL was an effective and efficient method to promote active learning in fifth-year medical students attending an ophthalmology course. In fact, many of the

Table 1. Responses from medical students to the questionnaire regarding TBL sessions

<table>
<thead>
<tr>
<th>Questionnaire Item</th>
<th>Agree (Score: 5 and 4)</th>
<th>Neutral (Score: 3)</th>
<th>Disagree (Score: 2 and 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBL sessions were better at fulfilling learning objectives</td>
<td>121 (71.59%)</td>
<td>23 (13.61%)</td>
<td>25 (14.80%)</td>
</tr>
<tr>
<td>TBL sessions enabled me to better understand concepts</td>
<td>134 (79.29%)</td>
<td>28 (16.57%)</td>
<td>7 (4.14%)</td>
</tr>
<tr>
<td>TBL sessions were more interesting than traditional lectures</td>
<td>146 (86.39%)</td>
<td>15 (8.88%)</td>
<td>8 (4.73%)</td>
</tr>
<tr>
<td>TBL sessions ensured greater student participation</td>
<td>123 (72.78%)</td>
<td>37 (21.89%)</td>
<td>9 (5.33%)</td>
</tr>
<tr>
<td>Students produced greater effort in TBL sessions</td>
<td>148 (87.57%)</td>
<td>16 (9.47%)</td>
<td>5 (2.96%)</td>
</tr>
<tr>
<td>More TBL sessions should be organized in the future</td>
<td>129 (76.33%)</td>
<td>27 (15.98%)</td>
<td>13 (7.69%)</td>
</tr>
</tbody>
</table>

Responses were scored using a five-point Likert scale, where 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree. TBL, team-based learning.
students reported that the method was good and satisfactory. However, some students reported that the amount of time they were supposed to prepare for class increased and was incompatible with their own learning style. This complaints may be common in students who have less familiarity with active learning methods.

TBL implementation in the cornea module of an ophthalmology course met the multiple goals and needs of our evolving course, including self-directed learning, active learning, knowledge application, and student accountability. Student-centered and self-directed learning occurred; students monitored their own learning progress and evaluated their success in achieving their learning objectives. Students received faculty and peer feedback. Students also studied course contents before the TBL sessions, and the class sessions were used exclusively for the assessment and application of knowledge through case-based discussions.

Analysis of the readiness assurance tests indicated that the team scores were above individual scores, suggesting effective team interactions. In only two courses, a total of three students IRAT scores were higher than their TRAT scores. These students could not discuss their opinions when they were not sure enough. With the help of immediate feedback, students were helped to clarify misconceptions and learned to provide support for their decisions with references to their peers.

In this TBL instructional strategy, faculty members were required to revise materials to articulate measurable learning objectives and develop self-directed study materials as well as perfect their facilitation of discussion skills.

The responses of students in this study indicate that most of the students preferred the modified TBL method to the traditional lecture method. TBL, as an active learning method, can be a highly effective tool for developing both students’ mastery of basic conceptual material and their higher-level thinking and problem-solving skills. Designing effective group assignments helps to maximize the extent to which the learning tasks promote the development of cohesive learning groups. The single best way to gauge the effectiveness of group assignments is observing the level of energy that is present when the results of the small-group discussions are reported to the class as a whole. Communication skills that are essential for physicians are developed by this method.

There is a growing amount of evidence from different disciplines to support the efficacy of active learning (4, 7, 12, 15). Our experience in implementing a TBL approach that created an appropriate active learning environment was well received, according to both student and teacher feedback. Also, by the virtue of this feedback, we still continue to adjust various aspects of the course. A huge majority of the students expressed positive feelings about the effectiveness of the method in terms of training in data analysis together with problem solving using teamwork.

DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the author(s).

AUTHOR CONTRIBUTIONS
Author contributions: L.A. and O.A. conception and design of research; L.A. analyzed data; L.A. and O.A. interpreted results of experiments; L.A. drafted manuscript; L.A. and O.A. edited and revised manuscript; O.A. performed experiments; Y.C. approved final version of manuscript.

REFERENCES