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Team-Based Learning in Health Care Education: Maintaining Key Design Elements

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Abstract

Introduction: Problem Based Learning (PBL) and Team-based learning (TBL) both provide excellent examples of learner-centred approaches, allowing students to work together to solve professionally relevant problems. Although PBL provides a more traditional example of collaborative learning, TBL has recently gained popularity within health care education. The design of TBL addresses many resource challenges within clinical education including increasing student numbers, and limited availability of teachers who have competing clinical, research and teaching demands. There are also many educational benefits for students that arise from the key design elements of TBL.

Purpose: It seems likely that as health care schools attempt to reduce costs, they will move towards TBL implementation. However, published literature, as well as our own experience indicates that variation from a standardised TBL framework, may result in poorer outcomes for students, and limit the ability of others to understand the learning and teaching process. This paper considers the pedagogic advantages of TBL that are reliant upon its unique, key design elements.

Conclusion: Relatively new to health care education, TBL provides an innovative approach to student-centred learning that helps to prepare students for effective collaboration, using content that is relevant to future practice. As TBL becomes part of many health care curricula, it is important to ensure the integrity of TBL is maintained. That is, poor design or lack of resources should not allow the essential steps of TBL to be discarded. Key factors for effective TBL include appropriate allocation of students to small groups, out of class preparation, pre-class assessments, well designed team activities, the presence of a well-trained facilitator during class, and immediate feedback. These elements motivate students to prepare, promote collaboration amongst students, and focus team discussion. While it appears inevitable that TBL activities within healthcare will find it difficult to incorporate all design elements of the TBL method, reporting accurately and consistently on TBL activities will assist the health care education community in understanding the relative merits of TBL compared to other teaching techniques.

Keywords: Health care; Problem based learning (PBL); Team-based learning (TBL)

Introduction

Collaborative learning activities, where students work together in small groups towards a common goal assist in developing team-building skills - skills that are essential in the health-care setting [1]. Both Problem Based Learning (PBL) and Team-based learning (TBL) provide excellent examples of learner-centred approaches that allow students to work together to solve professionally relevant problems. Within health professional education, both PBL and TBL approaches take advantage of small-group learning, building on students' combined knowledge to engage in real-life clinical problems. Although PBL provides a more traditional example of collaborate learning, TBL has recently gained popularity within health care education. In our recent systematic review of TBL in medical education, we found 20 articles since 2004, reporting the use of TBL in medical education [2]. The majority (70%) of these TBL programs were utilised during the pre-clinical years, across a range of disciplines and content areas. These include; basic sciences, medical ethics, neurology, pharmacology, anatomy, evidence-based medicine, ambulatory care, psychiatry, pathology, and physiology. It is clear from our systematic review, and the wider literature, that TBL has many resource and pedagogic advantages, which may explain its recent rise in popularity.

Indeed, the design of TBL addresses many resource challenges within clinical education including increasing student numbers, and limited availability of teachers who have competing clinical, research and teaching demands [3]. Australian workforce data indicates that many doctors, nurses and midwives, will retire within the next 20 years, leaving a shortage of clinical educators [4]. With an increasing number of healthcare students and decreasing number of faculty, TBL offers resource-saving measures for all medical and nursing schools. In short, TBL allows a large group of students to take part in small-group learning experiences without requiring a large number of faculty. TBL can be applied to both small classes (<25 students), and large classes (>100 students). However, the actual group sizes within these large classes are quite small (5-7 students) [5].

While there are obvious advantages to TBL in terms of resource savings, students are attracted to its active and collaborative approach to learning. Unfortunately, many health profession education courses simply call any small group activities that take place within large classes 'team-based learning' without the inclusion of the necessary steps to gain the pedagogic advantages. This has been noted by Haidet and colleagues [6], and highlighted in our own systematic review of TBL [2], which cited significant variability across reported implementations in terms of design elements. It seems likely that as more health care schools attempt to reduce costs, they will move towards TBL implementation. Substantial variation from a standardised TBL framework, may result in poorer outcomes for students, and limit the ability of others to understand the learning and teaching process [6,7].

This paper considers the pedagogic advantages of TBL that are reliant upon its unique, key design elements.

Discussion

What is TBL?

Team-based learning (TBL) provides a highly structured form of small-group learning. As described by Parmelee and colleagues [5], TBL provides an *"active learning and small group instructional strategy that provides students with opportunities to apply conceptual knowledge through a sequence of activities that includes individual work, team work, and immediate feedback".*

Although TBL uses an instructional approach, requiring direction from the facilitator, it remains student-centred [5]. One teacher can facilitate a class of up to 100 students at a time in their small groups of five to seven students. Teams are allocated by the facilitator, and remain the same throughout the course. Prior to class, students have compulsory readings to complete. At the beginning of each class, students' individual knowledge of the compulsory reading is assessed by Multiple-Choice Questions (MCQ). The same MCQ test is then repeated by the students, this time as a team, thus promoting discussion in order to establish consensus. The correct answers are then released, giving immediate feedback on the team responses. Thereafter, the facilitator offers clarification where teams have experienced difficulty, or disputes. Students then work in their teams on their problem-solving activities, utilising the knowledge from the compulsory readings. The principle of the 'four S's' guides the content, structure, and process of the problem solving activity. That is, the problem should be significant; all teams should have the same problem; teams should provide a specific choice in their answers; and teams should report simultaneously. Facilitation of discussion between teams, and clarification of concepts then takes place. The specific steps of TBL are outlined in Figure 1.

TBL

1. Initial team formation
2. Pre-reading
3. Readiness Assurance process (MCQs)
   - Individual Test (iRAT) on prereading
   - Team test (tRAT) on prereading
4. Immediate feedback
5. Appeals, disputes
6. Problem-solving activity
   - Utilising the four Ss: Significant problem, Same problem, Specific choice, Simultaneous reporting

Figure 1: Steps in TBL

How are the pedagogic advantages to TBL promoted?

The advantages appear to be promoted by specific steps that, together, are unique to TBL, and include:

- Team formation and dynamics
- Out of class preparation and frequent assessment
- Provision of immediate feedback by an expert tutor
- Problem solving activity utilising the four Ss (Significant problem, Same problem, Specific choice, Simultaneous reporting)

Team formation and dynamics

TBL's integrated approach to developing students' professionalism skills, such as communication, leadership, and teamwork are invaluable [8]. While PBL is traditionally carried out in teams of 10 students, TBL activities take place in teams of 6 to 7 students. Our recent pilot study of TBL versus PBL at Sydney Medical School found students preferred to work in groups of five rather than 10 [9]. Students found that the smaller TBL teams prompted greater discussion and collaboration amongst students (Burgess et al, "in press"). Because students are made accountable for their own learning, both as individuals and as a groups, teamwork development is strongly encouraged [10]. Students are motivated to engage as a team with the activity at hand, enhancing learning and consolidating knowledge.

Additionally, the initial formation of the team is important. Michaelsen and Richards (2005) recommend that students be assigned to teams by the facilitator using a transparent process to give each team a diverse mix of students, and ensure that no pre-existing social groupings are formed [11]. We have used facilitator selection ourselves with TBL within an anatomy by whole body dissection course where 24 students from six different clinical schools attend an anatomy elective course for final year medical students [12]. Students initially wanted to self-select their teams, particularly since they had strong pre-existing connections with their own clinical school colleagues. However, at the end of the seven week course, students felt it had been beneficial to work in their groups of six as selected by the facilitator [12]. Competitive but cooperative relationships were formed within the groups, enhancing peer teaching among the members.

Out of class preparation and frequent assessment

Within TBL, the burden of learning content during class is shifted [13]. As in the 'flipped classroom', students come to class prepared, with designated pre-class reading. Additionally, students are motivated to do so. Individual student accountability is fostered by the use of assessments at the commencement of each class. Firstly, students sit for

an 'individual readiness assurance test' (iRAT), which is immediately followed by a 'team readiness assurance test' (tRAT). As a result, this creates a sense of friendly competitiveness, as well as a sense of responsibility towards their team members. This motivation of motivates students to come to class well prepared, has been reported frequently within TBL classes [2,9,13].

Provision of immediate feedback by an expert tutor

Immediate feedback is crucial to knowledge acquisition and retention, particularly within clinical education. Immediate feedback facilitates the understanding of knowledge, and the ability to apply this knowledge to a problem solving activity [14]. Without a tutor present, errors may go uncorrected, and a students' sense of being adrift in unfamiliar "territory" is amplified. In TBL, students receive immediate feedback, plus the opportunity for clarification/discussion from an expert tutor [11]. Unfortunately, feedback is often sadly lacking in PBL teaching sessions [9]. In fact, the unique TBL design allows one tutor to provide feedback and discussion to a class size of up to 100 students. Although each team is self-managed, discussion between teams is facilitated by the sole tutor [6]. Additionally, provision of immediate feedback on test performance contributes to the competitions between TBL teams. Students, both as individuals and as teams, compete to achieve the highest scores [9,12].

Problem-solving activity (utilising the 4 S: Significant problem, Same problem, Specific choice, Simultaneous reporting)

Participation in the problem solving activity promotes team learning in both PBL and TBL [10]. Here, students are given the opportunity to apply knowledge learnt from course content by working in teams to solve complex clinical problems that apply to real-life situations. Although the problem-solving step within TBL has been described as the heart of TBL [6], details of this element of design have rarely been reported in published literature [2]. Limited description of this aspect of TBL makes it difficult to understand the process and outcomes of implementation.

In our recent pilot study, we found that smaller size of the TBL, meant that all students had a greater opportunity to participate in the problem-solving activity [9]. However, we experienced some difficulty when 'converting' and implementing PBL cases for use in TBL format [9]. Consistent with recent literature, we found that the problem solving activity raised some difficulties that appear specific to health care education. As noted by Michaelsen himself [11], application of TBL within the health care field, is constrained by a number of pre-determined contextual factors, which reduce the ability to adhere to all classic design elements of TBL. Although a multiple choice format is appropriate for grading the readiness assurance test, allowing only a "specific choice" within the problem-solving activity phase of TBL "restricts the discussion to predetermined outcomes" [15]. Similarly, the problem-solving activity within our recently reported TBL anatomy by whole body dissection course, involved hands-on cadaver dissection, rather than a paper-based scenario, making it difficult to incorporate a specific choice exam format [12]. However, an advantage of avoiding "specific choice" within the problem-solving activity is that faculty do not need to generate the specific choice questions/answers (MCQs), which can be difficult and time consuming to write [16].

Conclusion

Although relatively new to health-care education, TBL provides an innovative approach to student-centred learning that helps to prepare students for effective collaboration, using content that is relevant to future practice. As TBL becomes more popular in health care curricula, it is important to ensure the integrity of TBL is maintained. That is, poor design or lack of resources should not result in discarding the essential steps of TBL. Key factors for effective TBL include appropriate allocation of students to small groups, out of class preparation, pre-class assessments (individual and team), well designed team activities, the presence of a well-trained facilitator during class, and immediate feedback. These elements motivate students to prepare, promote teamwork, and focus team discussion. While it appears inevitable that TBL activities within healthcare will find it difficult to incorporate all design elements of the TBL method 2, [6,15,16], reporting accurately and consistently on TBL activities will assist the health care education community in understanding the relative merits of TBL compared to other teaching techniques [2,6].

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