Review Article

Team Based Learning in Medical Education – A Review

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Received: 31-01-2017; **Revised:** 18-03-2017; **Accepted:** 05-04-2017.

ABSTRACT

Team-based learning (TBL) is a structured form of small-group learning that emphasizes student preparation out of class and application of knowledge in class. The purpose of TBL is to enhance student engagement and the quality of student or trainee learning. TBL has been reported to improve student performance in medical ethics and increased student engagement and satisfaction. Medical schools especially who suffers from the deficient human and financial resource can start thinking to adopt TBL as an instructional strategy and need to develop academic staffs who should be equipped with essential skills and attitude to supplement traditional methods of teaching and learning.

Keywords: Team Based Learning, TBL, Medical Education.

INTRODUCTION

A Few Definitions

"Team-based learning (TBL) is a structured form of small-group learning that emphasizes student preparation out of class and application of knowledge in class. Students are organized strategically into diverse teams of 5-7 students that work together throughout the class".[1] "TBL is an evidence-based collaborative learning teaching strategy designed around units of instruction, known as modules, that are taught in a three-step cycle: preparation, in-class readiness assurance testing, and application-focused exercise. A class typically includes one module".[2] TBL is a collection of practices that support one another for powerful instructional effect.[3] Parmelee and colleague's defined team-based learning (TBL) as "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, teamwork, and immediate feedback".[4]

Brief History of Team Based Learning

Larry K. Michaelsen, Professor of Management and Business Communication, University of Oklahoma, in 1979, found that his class size had been tripled from 40 to 120 students. He had been using a case-based Socratic teaching approach that involves facilitating problem-solving discussions - an approach that is very close to the structure that TBL classrooms use today. [5]

The main Purpose of TBL

The purpose of TBL is to enhance student engagement and the quality of student or trainee learning. The benefits of TBL comprises of improving class-attendance, augment pre-class homework, enhanced academic performance, and the expansion of social and group expertise, "in class sizes ranging from 10 to 400-plus, with courses in hundreds of academic disciplines and students ranging from freshmen on academic probation to doctoral level students".[6]

Introduction of Team Based Learning in Medical Education

Boon shoft School of Medicine, Wright State University is the first medical school in the USA to adopt so fully TBL as an educational strategy. Boon shoft School has successfully executed TBL in all preclinical courses and most of our clerkships.[7] Boon shoft School of Medicine believes that TBL as an instructional approach can vibrantly augment the quality of student learning by **i.** "enhancing problem-solving skills; **ii**. Replacing or reducing lecture time; **iii**. Ensuring that students are prepared and on time to class; **iv**. Creating a remarkable amount of energy in the classroom; and **v**. promoting teamwork".[7] Although faculty members of the department physiology, Baylor College of Medicine in late 1990's were first to introduce TBL successfully to promote active learning in professional disciplines like medicine.[8] Furthermore, it has been reported that TBL enriches the "mastery of course content". As TBL successfully improves especially among rock-bottom poor academic performer in medical school than highest-quartile students.[9] The efficiency of TBL has proved ten medical institutions who adopted as an instructional method in the USA and recommended that TBL follows the rule of pedagogy.[10] Another systematic review reported that TBL provided an optimistic learning familiarity for students. Therefore, recommended that faculty should stick to a uniform TBL framework, investigating and disseminate on

their program's outcomes for the future benefit of medical education policy and planning. [11]

Several Success Stories of TBL

TBL as adult instructional strategy was successfully implemented in Hofstra North Shore, New York – Long Island Jewish (LIJ), Internal Medicine Ambulatory Residency Program. TBL resulted in an active resident engagement, facilitated group learning, and increased satisfaction by residents and faculty.[12] Compared to passive instructional strategies, TBL exhibited better development in knowledge scores, with continued upgrading up to 48 hours later. This effect is larger in academically poor students. TBL is also similarly effective method for cultivating knowledge in neurological settings and neurological emergencies in undergraduates.[13] Incorporating TBL approach give rise to much better progress and constancy in the nervous system inspection knowledge of nursing students compared to traditional didactic lecture-based instructional strategy; consequently, this technique could be competently used as an effective instructive approach in nursing education.[14] TBL as teaching style resulted in high student satisfaction, as a learning approach for family planning for a medical student. [15] TBL from the viewpoint of student perception and knowledge acquisition is an effective approach to use for the teaching of pharmacodynamic principles of pharmacology. [16]

Cost Efficacy of Team Based Learning

TBL is a well-defined teaching-learning method initiated and established by Dr. Larry K. Michaelsen that is now being used efficaciously in medical and health professional education. The TBL method allows a single instructor to conduct multiple small groups simultaneously in the same classroom, as an instructional strategy that can be used for groups as large as 200.[7, 17] Therefore, the method must be cost-effective as TBL can be managed by one instructor and in one classroom.

Principal Advantages of Team Based Learning Over Other Method

One Iranian study compare TBL with the traditional lecture as a method of instruction in 2014 in neurology course revealed more education achievement and student satisfaction; whereas, conventional lecture method was identified as low learning and satisfaction. [18] TBL has been reported to improve student performance in medical ethics and increased student engagement and satisfaction. The same research also recommended that TBL as a method of instruction should be considered for comprehensive application in medical education.[19] Another study demonstrates that TBL equally effective active learning approaches especially helpful among low academic performers[9, 20] and the best students of the year. [21] TBL is an effective instructional system for large groups of nursing students and ensures learning theories of pedagogy. [22]

Problem Based Learning: Another Learner-Centred Approaches

Problem-based learning (PBL) is a learner-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem. Students learn both thinking strategies and domain knowledge through PBL based teaching strategies. [23] The PBL was begun and established at the McMaster University Medical School in Canada in the 1960s and has since spread around the world. [24-26] The goals of PBL are to help students develop flexible knowledge, effective problem-solving skills, self-directed learning, effective collaboration skills and intrinsic motivation. [23] PBL teaching style actually ensures a style of active learning. [27] Pedagogy is the science and art of education, specifically instructional theory. An instructor cultivates theoretical knowledge and accomplishes the content of learning events in pedagogical settings. Contemporary pedagogy has been intensely influenced by the theories of three most important heavy-weights in the science of human development: Jean Piaget's cognitive theory of development and Lev Vygotsky and Jerome Bruner's social interaction and cultural theory. [28]

The Four Essential Elements of Team-Based Learning [29]

There are four essential elements of Team-Based Learning: groups, accountability, feedback, and assignment design. **Essential Element I** – Groups must be properly formed and managed. **Essential Element II** – Students must be accountable for their individual and group work. **Essential Element III** – Students must receive frequent and immediate feedback. **Essential Element IV** – Team assignments must promote both learning and team development.

Some Comparison between Team Based Learning Other Instructional Methods

One recent study concluded that students preferred various characteristics of the TBL based sequence, predominantly "motivation to do the pre-reading, and better engagement in the process" over traditional didactic method and PBL.[30] Furthermore, the TBL philosophies for any teaching-learning sessions were not dependent on teacher-student. Even one teacher can facilitate a large group of students. Students, however, emphasized they "need for more time within TBL for clinical problem-solving".[30] Another study found statistically significant (P<0.001) difference was observed between lecture-based and TBL. "Content validity index of the scale of student satisfaction was 94%, and external and internal consistencies of the scale were 0.954 and 0.921 orderly (P<0.001). The degree of satisfaction from TBL compared to the lecture method was 81.3%."[18] This study also revealed that students earned a higher level of learning were accomplished over traditional lecture method and therefore, recommended the transfer of instructional methods to TBL.[18] Another study also demonstrated that in the ambulatory care courses TBL

achieved statistically significant (*P*<0.001) higher scores over mixed active teaching-learning methods in terms of student performance in GPA and satisfaction. [31] The same study also reported that TBL provides an organized learning atmosphere to facilitate "pre-class reading assignments" that promoted to have better and auspicious feelings regarding TBL other active instructional methods. Teachers of the institute felt that TBL is "an effective and time-efficient method instructional method. [31] Although it was determined that the preliminary understandings at the 10 medical schools were promising and several studies also justify the promising qualities of TBL were favorable to obtain better learning outcomes over methods of instruction. [10, 32-39] Nevertheless, another study observes that 10 medical schools there were both improvement and deterioration in the use of TBL technique, and equally both circumstances would "provide valuable data to inform the choices of educators who are beginning to adopt and implement TBL". [40]

Team Based Learning and Malaysia

University Kebangsaan Malaysia (UKM) is a topmost rated national public university in Malaysia. [41] It has been reported that UKM is under the way to adopting TBL method instruction beside traditional didactic lecture and another active method teaching. [41] The same study also revealed that the visions of the teachers to introduce TBL at UKM medical center were affirmative and inspiring. The attitude on the road to adaptation from the traditional methods and other active learning techniques to ground-breaking TBL was also constructive. [41] Another study conducted in the same University among medical students in medical genetics course revealed that "the students' performance in a group readiness test was better than in individual readiness tests". [42] The efficiency of TBL was additionally observed in the examination result the students obtained much better grade point average in comparison with traditional methods. [42] Equally all stakeholders' both teachers and students endorsed TBL as an alternative useful instructional tool and thereafter, suggested for execution of TBL method of approach for the advantage and assistance of future students and educators.[42] One more Malaysian study in general education program also revealed similar positive perception observed towards TBL among the study respondents but suggested teachers need to be trained properly to implement and conduct TBL method. [43]

Team Based Learning and reports from Developing Countries

One Indian study revealed that TBL method added an advantage in developing of better "engagement and mastery course content".[44] This study also revealed statistically significant (*P*<0.001) higher scores in MCQ among the students who were taught through TBL method than other instructional methods and "particularly useful for application-based learning". [44] Another study from Iran also described that by commissioning up-to-date educational methods like TBL, medical students are not only learning and perform better, nonetheless, as well attain the compulsory specialized "skills for future performance" and to "face various professional challenges". [45]

TBL Adoption in Developing Countries and Conclusion

Very often developing countries suffers from experienced and qualified academic staffs especially medical faculty. [46] Again, "TBL is learner centered with the teacher acting as an expert facilitator and provides students with opportunities to expose inconsistencies between their current understandings and new experiences thus stimulating the development of new personal mental frameworks built upon previous knowledge". TBL ensures active learning utilizing pertinent clinical problems and collaboration between students. TBL also ensures to build teamwork skills and achievement during the group sessions. TBL is firmly based "in the theory and is a promising method to strengthen healthcare education"; as TBL possesses all necessary components of "constructivist educational theory". [47] Therefore, medical schools especially who suffers from the deficient human and financial resource can start thinking to adopt TBL as an instructional strategy and jump to develop academic staffs who are equipped with essential skills and attitude to supplement traditional methods of teaching and learning.

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Source of Support: Nil, **Conflict of Interest:** None.