2010; 32: 105–107 MEDICAL TEACHER

COMMENTARY

Team-based learning: Moving forward in curriculum innovation: A commentary

DEAN X. PARMELEE
Wright State University Boonshoft School of Medicine, USA

Introduction

Team-based learning (TBL) is an instructional strategy developed by Professor Larry Michaelsen at the University of Oklahoma's Business School, USA, in the early 1990s. He developed it because his class enrollments were increasing, he questioned the effectiveness of lectures, and he wanted to use classroom time for students to solve the kinds of problems they would face in the business world.

Professor Michaelsen discovered that his business school students had had 'small group' assignments and activities in other courses, but they felt that there was often great variability regarding how much each student contributed. Through trial-and-error, he crafted a structure for TBL that works to build both individual, small group, and whole class ACCOUNTABILITY. The three foundational components are: (1) *Advanced Preparation*, (2) *Readiness Assurance*, and (3) *Group Application*, with peer evaluation that matters and an appeals procedure that stimulates additional learner engagement with the content. Students come to class on time, prepared, and one faculty member conducts the session with the whole class (as few as 10 students to 120+ students; Michaelsen et al. 2007).

TBL and health professions education

In 2001, the United States Department of Education awarded a *Fund for Improvement of Post Secondary Education* grant to Baylor College of Medicine for the promulgation of TBL in health professions education. This award supported faculty development through workshops, national symposia, and the establishment of a nonprofit organization – *The Team-Based Learning Collaborative* that has sponsored an annual conference since 2003. TBL is being used at schools of medicine, nursing, dentistry, veterinary science, physician's assistantship, residency programs, and continuing medical education programs at over 50 schools in the United States and at schools in countries, such as Japan, Korea, Singapore, Turkey, Israel, and two additional schools in the Middle East whose work appears in this *Issue* and contributes to the steadily growing body of literature on TBL. To date, over 30 articles and two books have been published. Research has shown that TBL is associated with positive learning outcomes (McInerney 2003; Levine et al. 2004; Dunaway 2005; Koles et al. 2005; Vasan 2005), increased learner engagement and preparedness (Kelly et al. 2005; Haidet 2006), improved problem-solving skills (Hunt 2003; Kelley et al. 2005), and better communication processes and teamwork skills (O'Malley 2003; Thompson 2007).

Critique of Zgheib et al.'s study

Guided by their institutional mission of implementing innovative teaching techniques' and their impression about the potential benefits of TBL from the literature, Zgheib et al. (2009) [this issue] were embolden to try TBL on a small scale as part of an established pharmacology course. Although their implementation of TBL diverged from the instructional strategy's inherent components, i.e., no Readiness Assurance, no use of grading, no peer evaluation, positive outcomes were achieved in that the students liked the experience, the instructors enjoyed the level of interaction in the class, and student performance on the end-of-course exam improved over the previous year. An additional benefit of using TBL noted by the Zgheib et al. (2009) [this issue] and commonly noted among proponents of TBL is that using TBL instead of customary small-group discussions was 'cost effective' because only one faculty member was required.

I concur with Zgheib et al. (2009) [this issue], that in future trials, they need to write questions for the application exercise that fit better with students' facility with more complex material. Indeed, the instructor's hardest task is to design *Group Application* (*GA*) questions that challenge the brightest students, foment both intra- and inter-team debate or 'constructive controversy' (Johnson 2000), and provide all students with the opportunity to apply course content to the kinds of problems that lie ahead in their future careers. It is much harder than preparing a series of lectures through which one hopes the students learn the 'content' and then be successful on the course exam.

Regarding interpretation of findings in Zgheib et al. (2009), the authors attribute the students' poor performance on *GA* questions about pharmacokinetics/dynamics to their relatively recent exposure to the material and complexity of that material. In my opinion, the students would have done much better with the more challenging questions had the authors included the *Readiness Assurance*, since this structural

Correspondence: Dean X. Parmelee, Wright State University Boonshoft School of Medicine, Academic Affairs, PO Box 927, Dayton, OH 45401-0927, USA. Tel: 1 937-775-3803; fax: 1 937-775-2842. email: dean.parmelee@wright.edu

ISSN 0142–159X print/ISSN 1466–187X online/10/020105–3 © 2010 Informa Healthcare Ltd.
DOI: 10.3109/01421590903548554

component is essential for insuring that students master the fundamental content before class, and it assures both them and the instructor that they are prepared for the more challenging *GA*. For the next iteration of the module, I suggest they construct a 10-question multiple-choice *Readiness Assurance* test (RAT: the students must do both the individual and the group components, followed by whole class discussion), the questions for which are derived from the assigned reading and lectures, but clearly foundational for the harder questions of the *GA*. The difficulty level of the questions should be tailored, so that the students feel that they are appropriately challenged in preparation for *GA*. A 'hand-to-glove' fit between *Advanced Preparation*, *Readiness Assurance,* and the *Group Application* exercise gives the instructor and students the best chance for a 'successful' module with maximum learning.

Critique of Abdelkhalek et al.'s study

In contrast to Zgheib et al.'s (2009) [this issue], interest in using TBL in a specific course (i.e., pharmacology), the work of Abdelkhalek et al. (2009) [this issue] intended to find a 'cost-effective' way of using 'small' group learning to prepare students, fresh out of high school, for the problem-based learning (PBL) curricula in their health professions schools. The authors were favorably impressed with the student feedback, their learning of the content, the fact that the groups were as engaged in the large classroom *together*, as they would have been in separate PBL section classroom, but with only one instructor instead of many. They made an interesting adaptation of the TBL *Advanced Preparation* phase by requiring the students to define the learning needs for the topic: a' la PBL. Next, they considered the *Readiness Assurance* to be a sequential presentation by each group of their key findings, concluding with a summarizing lecture by the instructor.

Seizing their innovation of having the students identify what they need to know to proceed with the 'problem' – a' la PBL – I would provide the students immediate feedback about whether or not they have mastered the content through *Readiness Assurance*: IRAT, GRAT, followed by whole class discussion to clarify any misconceptions. Then, posting of team-developed concept maps using the 'gallery walk' process (Michaelsen et al. 2007, p. 54) would insure and assure that everyone in the class was ready to tackle the next level of problem solving.

Additional comments

I have the following additional comments about these two contributions: First, Abdelkhalek et al. (2009) state that TBL 'is more unidirectional [than PBL] in its expected student outcomes.' (p. 5, line 30). There are several differences between PBL and TBL, but the expected student outcomes are similar and multidimensional, e.g., progressive acquisition of fundamental knowledge, application of this knowledge to solve important 'real-life' problems, development of effective and respectful communication skills. Second, 8–9 students in a group are too many. The ideal size is 5–7, and unlike PBL, having more small groups does not increase the need for more faculty. Third, neither article describes how the small groups were formed. This is an extremely important element for the implementation of TBL and needs to be done transparently and with considerable forethought to insure that there is diversity within teams, and that students with special skills or experiences related to the course goals are distributed across the teams. Last, neither article describes whether or not they used peer evaluation, another important part of the strategy.

Conclusion and future considerations/directions

Although both sets of authors designed instructional events that diverged from the TBL strategy, I commend them for 'trying out' TBL and doing so with a scholarly approach. Their endeavors illustrate enthusiasm to experiment, measure the outcomes, reflect on the results, plan for future iterations and share with the larger community. TBL will become increasingly adopted by medical educators, because it addresses so many of the professional competencies and enhances the learning experience. I encourage Zgheib et al. (2009) [this issue], Abdelkhalek et al. (2009) [this issue], and other educators to continue to explore in a scholarly approach how to implement it effectively in the varied contexts of medical education.

Divergence from the TBL strategy has been common as more educators strive to find 'active learning' approaches and see TBL as 'cost effective,' i.e., one or a few faculty can 'do it'. And, there are a myriad of contextual issues that lead to varying or adapting the strategy, e.g., class size, space, time allocation, and lack of support from curriculum leadership. I encourage others to continue to venture towards using classroom time for engaging students in solving problems rather than the faux absorption of knowledge that usually transpires. However, the TBL strategy is well tested and students benefit the most when all components are used. There is plenty of room for innovation and creativity within its structure, especially in the implementation phase. For instance, getting the teams of students to articulate what they think they need to learn to solve a specific problem, posting the composite of this as the *Advanced Assignment*, and creating the *Readiness Assurance* component to match would be an exciting capture and use of one of the treasured principles of PBL.

I caution educators not to adopt TBL, even in its pure strategy, just because they see it as a less-expensive way to have small group learning like PBL or case discussions. It requires considerable faculty development and an enormous time investment for the few who are charged with the design and implementation of the modules. That being said, once appropriately designed modules are integrated within a learning-centered curriculum, and instructors are facile with its implementation – the required faculty, space, and time resources may very well pose a cost savings.

For schools in the United States where curricula are so content-focused, its adoption requires faculty buy-in for a curriculum that is learning centered, and the objectives for which are derived from 'what do we want our students to be able to do with this information two-three years from now.' For the many schools that have either developed or adopted a PBL curriculum, learning how the more instructor-guided TBL might synergistically interface with it is an emerging opportunity.

Serendipitously, after the two TBL papers in this issue were accepted for publication, I visited both institutions and the authors showed me video clips of the students in their TBL sessions. The students were noisy, fully engaged, and demonstrating that they were learning a great deal. The instructors, also quite visible in the clips, were clearly in a new and exciting classroom and convinced that this strategy was worth the time and effort to develop. Imagine: students coming to class prepared, engaged in the exercises with each other, passionate and articulate about their decisions, and leaving a session having learned something that they can use. Can this be medical education?

Acknowledgment

The author thanks Dr Nicole Borges for her comments and suggestions on this commentary.

Declaration of interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

Notes on contributor

DEAN X. PARMELEE is the associate dean for Academic Affairs. He is a physician with specialty training in adult, child, and adolescent psychiatry, but most of his time is devoted to improving medical student education.

References

Abdelkhalek N, Hussein A, Gibbs T, Hamdy H. 2009. Team-based learning prepares students for problem-based learning. Med Teach 32(2): 123–129.

Dunaway GA. 2005. Adaption of team learning to an introductory graduate pharmacology course. Teach Learn Med 17(1):56–62.

Haidet P, Fecile ML. 2006. Team-based learning: A promising strategy to foster active learning in cancer education. J Canc Educ 21(3):125–128.

Hunt DP, Haident P, Coverdale JH, Richards BF. 2003. The effects of using team learning in an evidence-based medicine course for medical students. Teach & Learn in Medicine 15(2):131–9.

Johnson DW, Johnson RT. 1995. Creative controversy: Intellectual challenge in the classroom (3 edn). Edina, Minn.: Interaction.

Kelly PA, Haidet P, Schneider V, Searle N, Seidel CL, Richards BF. 2005. A comparison of in-class learner engagement across lecture, problem-based learning, and team learning using the STROBE classroom observation tool. Teach Learn Med 17(2):112–118.

Koles P, Nelson S, Stolfi A, Parmelee D, DeStephen D. 2005. Active learning in a Year 2 pathology curriculum. Med Educ 39(10): 1045–1055.

Levine RE, O'Boyle M, Haidet P, Lynn D, Stone MM, Wolf DV, Paniagua FA. 2004. Transforming a clinical clerkship through team learning. Teach Learn Med 16(3):270–275.

McInerney, MJ. 2003. Team-based learning enhances long-term retention and critical thinking in an undergraduate microbial physiology course. Microbiol Educ J 4(1):3–12.

Michaelsen L, Parmelee D, McMahon K, Levine R. 2007. Team-based learning in health professions education. Sterling, VA: Styllus Publishing.

O'Malley KJ, Moran BJ, Haidet P, Schneider V, Morgan RO, Kelly PA, Seidel CL, Richards B. 2003. Validation of an observation instrument for measuring student engagement in health professions settings. Eval Health Prof 26(1):86–103.

Thompson B, et al. 2007. Team-based learning at ten medical schools: Two years later. Medical Education 41(3):250–257.

Vasan NS, DeFouw D. 2005. Team learning in a medical gross anatomy course. Med Educ 39(5):524.

Zgheib NK, Simaan JA, Sabra R. 2009. Using team based learning to teach pharmacology to second year medical students improves student performance. Med Teach 32(2):130–135.