DESCRIPTIVE ARTICLE

ASE

# Team-Based Learning in Anatomy: An Efficient, Effective, and Economical Strategy

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Team-based learning (TBL) strategy is being adopted in medical education to implement interactive small group learning. We have modified classical TBL to fit our curricular needs and approach. Anatomy lectures were replaced with TBL that required preparation of assigned content specific discussion topics (in the text referred as "discussion topics"), an individual self-assessment quiz (IRAT), analysis of the discussion topics, and then the team retaking the same quiz (GRAT) for discussion and deeper learning. Embryology and clinical correlations were given as lectures. Unit examinations consisted of graded IRAT and GRAT. The National Board of Medical Examiners (NBME) Subject Examination was the comprehensive final examination. To evaluate the effect of TBL on student performance we compared the departmental and NBME subject examination scores between the traditional and TBL curricula. We collected five years of data on student performance in TBL-based anatomy and lecture-based preclinical courses. Our results show that departmental and NBME subject examination scores for TBL-based anatomy were higher than those for lecture-based anatomy. We subsequently compared average NBME scores for anatomy with those in other preclinical courses that were lecture-based. Average NBME anatomy scores were significantly higher than those for all the lecture-based preclinical courses. Since the introduction of TBL in anatomy, student performance has progressively improved in the NBME subject examination. Students perceived TBL as a motivator to be a responsible team member and to contribute to collective learning by the team. Further, it reinforced self-directed learning and fostered an appreciation for peer respect. Interestingly, these perceptions were uniform irrespective of student course performance. Anat Sci Educ 4: 333–339. © 2011 American Association of Anatomists.

*Key words:* gross anatomy teaching; medical education; students performance; team-based learning; economical strategy

## INTRODUCTION

"To teach is to engage students in learning" (Christensen et al., 1992) defines the premise that engaging students in learning is vital to a sustained lifelong commitment to learning. Consequently, the role and responsibility of the teacher becomes more a designer and facilitator of learning (Smith et al., 2005). A meaningful and lasting educational experience involves the learner having a sense of ownership for the contents, goals, and objectives, and perhaps planning strategies in the learning process. As stated by Knowles (1968), learning should be pragmatic, in that what is learned is in context and applied to real world situations. Knowles' latest tenet of androgogy holds that self-directed learners, who are responsible for their own learning, are more motivated by internal factors such as enthusiasm, self-direction, self-esteem, and self-confidence than external pressures (Misch, 2002). To enhance students' success, especially when they are learning theoretically multifaceted and content-dense materials (such as anatomy), teachers should not allow passive approaches (intensive lecturing) to learning. There is growing evidence that team-based learning (TBL) is an effective way of

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Received 2 June 2011; Revised 19 August 2011; Accepted 22 September 2011.

Published online 13 October 2011 in Wiley Online Library (wileyonlinelibrary.com). DOI 10.1002/ase.257

incorporating interactive small group peer teaching and enthusiasm for learning (Parmelee, 2007).

The concept of TBL focuses on learning defined by preclass preparation and subsequent in-class team discussion. In the absence of anatomy lectures, a series of organized learning activities were provided to help students build baseline facts into a framework of conceptual interpretation and understanding (Vasan and DeFouw, 2005; Vasan et al., 2008, 2009). Faculty organizes the learning material to enable students to accept ownership of their own and their peers' learning. This results in groups that function as powerful learning teams. TBL is based on individual accountability, insures rigorous team interaction to accomplish both competence (what individuals know or are able to do in terms of knowledge, skills, and attitude) and capability (extent to which individuals can adapt to generate new knowledge and continue to improve performance).

Team-based learning is a thriving; well-established innovative instructional strategy that was first developed and tested in 1970s by Professor Larry Michaelsen in the business school at the University of Oklahoma (Michaelsen, 2004). Furthermore, Michaelsen was able to develop and implement TBL for large-class settings that dramatically changed the lecture time into a small group interactive learning format. In place of lectures he provided assignments to prepare for class room discussion and problem solving (Michaelsen, 2004).

Increasingly, courses are being taught using TBL in both undergraduate medical education (Siedel and Richards, 2001; Vasan, 2003; Nieder et al., 2005, Vasan and DeFouw, 2005; Vasan et al., 2008, 2009), clerkships (Hunt et al., 2003; Levine et al., 2004), graduate medical education (Haidet et al., 2002, 2004; Levine et al., 2004), and post secondary programs (Michaelsen and Sweet, 2007). Recent reports include the use of TBL in anatomy teaching (Vasan, 2003; Nieder et al., 2005; Vasan and DeFouw, 2005, 2008; Vasan et al., 2008, 2009). Since medical schools are creating integrated and interdisciplinary courses during the preclinical years, TBL is particularly useful because of its emphasis on teamwork, mastery of content, and problem solving for clinical application. TBL also requires regular preparation and attendance.

In August 2004, the New Jersey Medical School introduced a comprehensive new four-year curriculum that resulted in decreased curricular time for anatomy and a mandate to implement small group active learning modalities with a concomitant decrease in lecture time. In anatomy, laboratory dissection time was minimally reduced and basic anatomy lectures were eliminated. Thus, it became necessary for us to pilot TBL to assess its feasibilities and acceptance.

Since 2005, we have successfully implemented TBL in teaching our medical anatomy course. Except for the anatomy course, the remaining first year courses retained much of the pedagogical approach associated with passive, lecture-based learning. TBL enabled the authors to set learning objectives, select content and resources, and prepare quizzes and tests. In addition, the authors addressed learners' misconceptions and knowledge deficits during TBL sessions.

This study extends our previous reports as outcomes from National Board of Medical Examiners (NBME) Subject Examinations, and responses to Graduation Questionnaires highlight the effectiveness of TBL pedagogy relative to the other traditionally taught preclinical courses. We believe that our results have added new dimensions to the existing literature on TBL. That is, TBL can be modified to fit new curricular needs of a content rich course and simultaneously improve student performances and satisfaction.

# METHODS

For the benefit of the readers, we have summarized the salient features of classical TBL and our modified TBL.

## Classic TBL

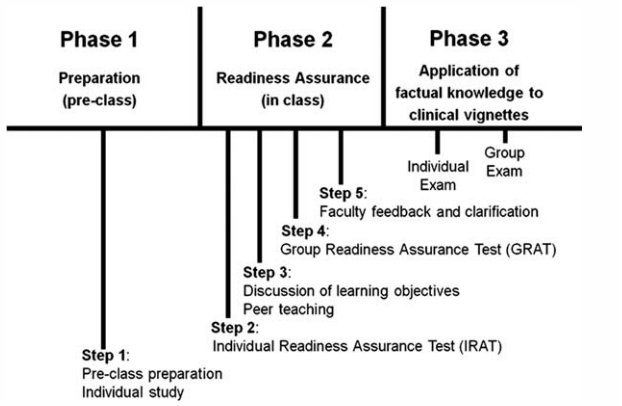
Members of each team are randomly assigned. Course structure involves didactic lectures in a large group format. It has three phases, where Phase 1 involves out of class preparation, Phase 2, in-class Individual Readiness Assurance Tests (IRAT) and Group Readiness Assurance Tests (GRAT), and Phase 3 involves application exercises that consist of cases in the form of vignettes with a subset of questions related to the case. In Phase 3, all the teams answer each question simultaneously to facilitate inter-team discussion. Questions can be challenged by providing written explanation. If the challenge was accepted only the team that challenged received credit.

## Modified TBL

Our entering class size of 169–178 includes students in the seven year BA-MD program (10%), students in MD-MPH program (5–10%), students with post baccalaureate educations (25–30%), and students with recent four-year undergraduate degrees (50%). Based upon the diverse backgrounds of the class, the course coordinators assigned individuals to small groups to ensure well-balanced teams. Any modification to the classical TBL is based on the needs and local culture of the school. It is a common practice to use this pedagogical strategy to fit the course structure, curricular time and other local factors.

In Phase 1, we assigned readings from required textbooks, Clinically Oriented Anatomy, (Moore et al., 2010) or Gray's Anatomy for Students (Drake et al., 2010) and created "content specific discussion topics." These topics were based, in addition to textbook reading, on other didactic materials such as Grant's Dissector (Tank, 2008), Grant's Atlas of Anatomy (Agur and Dalley, 2008), or Atlas of Human Anatomy (Netter, 2010) and on assigned cadaver dissections. Discussion topics focused on clinical conditions that required application of anatomical knowledge and critical thinking. Students use only the textbook, atlas, and dissector. Review books are excluded as required books but many students use them to review anatomy.

In Phase 2, all team encounters started with an ungraded multiple-choice quiz (MCQ) that was taken individually (10 min). Individual quizzes were immediately scored and this allowed us to monitor each student's level of preparation and enabled feedback when warranted. Following the individual quiz, teams analyzed the assigned "discussion topics" (90 min) to foster deeper understanding of the issues' concepts. The authors (N.S.V. and D.O.D.) monitored the team discussions by moving among the teams, provided clarification on issues where students had difficulties, asked probing questions, and provided feedback when necessary. Following the discussions, teams collectively retook the individual quiz, by discussing each question (20 min) and selecting one common answer. Immediate Feedback Assessment Technique (IF-AT®) forms (Epstein Educational Enterprises Inc., Cincinnati, OH) were used for the group quizzes. This form helped students




## Figure 1.

Three phases of team-based learning (TBL) and the steps involved are shown. As described in the methods, the steps are different from the classical TBL originally suggested.

identify incorrect answers immediately and discuss questions more in depth, thus facilitating deeper understanding of the materials. IF-AT answer sheets contain rectangles (marked A, B, C, D, or E) for each multiple choice question. After the team agrees upon an answer choice, a thin opaque covering on the chosen rectangle is scratched off. If the answer is correct, a star appears within the rectangle and full credit is received. If the answer is incorrect, further discussion within the team creates additional choices until the correct answer is identified. No credit is received for the additional choices. Since the quizzes are case based we did not use Phase 3 (application exercise) of the classical TBL. However, we used a modified Phase 3 as described below.

In our modified Phase 3, students take the high-stake MCQ unit examinations which are case based and require application of course concepts. Each unit examination is taken individually as well as by team and each score is weighted differently for grading purposes. Although classical TBL requires inter-team discussion our students and faculty found it to be a redundant exercise; hence we discontinued this phase after the pilot year.

### Course Structure

The human anatomy course, which is offered in the fall semester, is divided into three units—thorax, back, and upper extremity (six weeks); head and neck (five weeks); and abdomen, pelvis, perineum, and lower extremity (eight weeks). Approximately 55–60% of course time is spent on cadaver dissection in small groups (four students per cadaver); 30–33% course time involves the TBL sessions and the remainder includes embryology and clinical correlation lectures. Faculty coverage of the laboratory (40–43 tables) is as follows: 10–11 dissection tables (40–44 students) are covered by a single faculty member, whereas the course coordinators rotate among all the dissection tables. For TBL, the students were assigned to teams of six, and 18–24 team encounters (team discussions) occurred during the semester. TBL involves three phases (Fig. 1). Each TBL session was scheduled for 2 hours and often teams continued their discussion longer. All the TBL sessions were monitored full time by the authors continuously rotating through the teams during their discussion. Clinical correlation lectures explained the anatomical basis of various clinical conditions (e.g., Horner's syndrome; Bell's palsy; winged scapula, etc.).

### Peer Evaluation

Evaluations of teammates within each team were collected after the unit examinations and constituted 5% of final course grades. These evaluations enabled proactive counseling of the few students who initially received low scores from their peers.

### Student Assessment

The students take three-graded MCQ unit examinations (see course structure above), which are based solely on clinical vignettes. The examinations are scored both individually using Scantron® forms (Scantron Corp., Eagen, MN) and by teams using IF-AT® forms. Teams are also allowed to challenge any examination answers, and if a challenge is accepted, the result is applied to the entire class (unlike the classical TBL where only the challenging teams received credit). The comprehensive final examination consists of the anatomy and embryology NBME Subject Examination and is taken individually only. NBME Subject Examinations for various subjects are made available to medical schools for a fee, and are administered according to their guidelines. The NBME scores the examinations and the grades are sent via e-mail to the Office of Education. The course grading rubric for student assessment is as follows: 40% from the individual unit examinations, 15% from the individual NBME final examination, 30% from the individual practical examinations, 10% from the team unit examinations, and 5% from the individual peer evaluations. Thus, 85% of the course grade for each student reflects individual achievement and 15% denotes a combination of team scores and peer evaluation.

Before 2003, the course content was delivered via lectures that focused on factual anatomy without clinical correlation. Short conferences, reviews, small group sessions were typically offered prior to the course examinations. Assessment was K-type MCQ that required recall of factual anatomy or embryology without clinical applications and also included true/false questions, fill in the blanks, etc. Hence, we used a single year (2003) as historical control that corresponds to current assessment style.

## RESULTS

To evaluate the possible effect of TBL on student performance we compared the unit examinations and NBME Subject Examination scores between the previously taught traditional curriculum and the TBL curriculum (Table 1). We obtained from the Office of Admissions entering class averages for Medical College Admission Test (MCAT®) scores, and total and science grade point averages (GPAs) to evaluate the quality of classes compared and studied (Table 2). We also compared students' performances on the NBME Subject Examinations in other required first year courses to the NBME anatomy and embryology scores (Fig. 2). Additionally, from the "graduation questionnaire" we extracted information that reflects levels of student satisfaction with the basic science courses (Fig. 3).

## Table 1.

**Comparison of Class Averages in the Course and National Board of Medical Examiners (NBME) Subject Examinations**

| Type of curriculum | Year | Class examination performances | |
|---|---|---|---|
| | | Anatomy unit examinations (Average % score) | NBME subject examination (Average % score) |
| Traditional | 2003 | 73.3 | 64.0 |
| TBL | 2005 | 84.6 | 72.0 |
| TBL | 2006 | 85.6 | 78.0 |
| TBL | 2007 | 85.0 | 79.0 |
| TBL | 2008 | 83.0 | 76.0 |
| TBL | 2009 | 83.3 | 80.0 |
| TBL | 2010 | 81.4 | 79.0 |

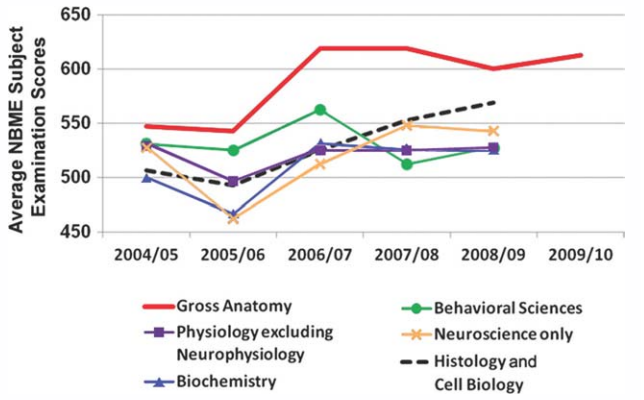
Traditional curriculum refers to lecture based teaching. Scores for 2004 are not included since it was the year when TBL was piloted. Scores for TBL curriculum were statistically different ($P < 0.05$, using two-tailed $t$-test) from the traditional curriculum score (2003) for each unit and for NBME examination. Team grades shown here are for groups of six members.

## Table 2.

**Comparison of Entering Class Averages for National Board of Medical Examiners (NBME) Subject Examination Scores and Grade Point Averages (GPAs)**

| Year | MCAT | | GPA | |
|---|---|---|---|---|
| | NJMS | US | Total | Science |
| 2003 | 29.6 | 29.2 | 3.47 | 3.39 |
| 2004 | 29.9 | 29.5 | 3.50 | 3.40 |
| 2005 | 30.2 | 30.0 | 3.51 | 3.40 |
| 2006 | 30.4 | 30.1 | 3.57 | 3.50 |
| 2007 | 31.0 | 30.8 | 3.57 | 3.49 |
| 2008 | 31.3 | 30.9 | 3.58 | 3.53 |
| 2009 | 31.4 | 30.8 | 3.54 | 3.49 |
| 2010 | 31.6 | 31.1 | 3.64 | 3.58 |

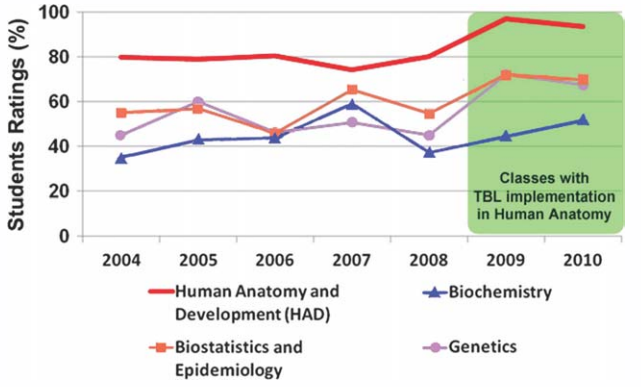
Average Medical College Admission Test (MCAT®) scores for New Jersey Medical School (NJMS) students and all United States (US) students are presented. Average GPA for NJMS students is depicted as total grades and grades for the science subjects.




## Figure 2.

Comparison of New Jersey Medical School (NJMS) student performance in the National Board of Medical Examiners (NBME) Subject Examination. The national average score is 500. Both histology and physiology are lecture-based traditional courses. In anatomy, 2004/2005 was the academic year team-based learning (TBL) was piloted and 2005/2006–2009/2010 the years when modified TBL was fully implemented. Scores from other courses after 2008/2009 academic year were not made available.

In Table 1, we compared the class performances from a lecture-based traditional curriculum (2003) with the years we implemented our modified TBL curriculum (2005–2010). In the three unit examinations, the class averages in year 2003 ranged from 70% to 77%. There was a modest improvement in 2004 (unit examinations averages ranged from 77% to 81%), when we piloted the TBL concept (not included in the table). Importantly, when we fully implemented the modified TBL curriculum in 2005, the class averages in the unit examinations were further improved with ranges from 81% to 86%. As expected, the team averages in the unit examinations were always higher (ranging from 97% to 100%) than




## Figure 3.

Percent of New Jersey Medical School (NJMS) graduates ranking basic science courses as "good" or "excellent" on the Association of American Medical Colleges (AAMC) Graduation Questionnaire (GQ), 2004–2010. The Graduation Questionnaire was obtained from the AAMC web site (AAMC, 2010). Eventhough, a small proportions of the graduating class responded to this survey it does convey student view.

the individual averages (Table 1). We further observed that individual students or teams who consistently performed well in the IRAT/GRAT performed well as individuals or as teams in the course examinations.

Table 1 shows average class scores for the NBME gross anatomy and embryology subject examination in the last five years. The class averages in the years when TBL was implemented are significantly higher than the previous years when the course followed a lecture-based curriculum. For each unit examination, and for the NBME Subject Examination, differences in results were statistically significant when the TBL curriculum was compared to the traditional curriculum ($P < 0.05$ in each case, using two-tailed *t*-test).

Table 2 shows the academic profile of students admitted to our school. Since 2003 there is a steady increase in the MCAT scores of our students, which also corresponds to the national trend. The total and science GPAs of entering classes increased very little.

Comparison of students' performances in the NBME Subject Examinations for all required first year courses indicate the advantages of the TBL curriculum over the lecture based traditional curriculum followed by the other courses (Fig. 2). The Histology and Cell Biology course also showed improved student performances following the introduction of TBL in 2007. During the period compared other preclinical courses showed modest improvement however it was not consistent. Figure 2 is provided to show a graphical representation of a "trend over a period" and hence no statistical analysis was performed.

Additionally, from the "Graduation Questionnaire (GQ)" (AAMC, 2010) the Office of Education extracted information that reflects student satisfaction with the anatomy course (Fig. 3). Even though the proportion of students who responded to the graduation questionnaire was low (varied from 36% to 65%) the data show a trend over a period of time.

Although we did not use a questionnaire to collect feedback from the faculty, we conducted monthly focus group sessions with the teaching staff. Focus group sessions are a way to receive faculty feedback, improve teaching, assess and discuss students' engagement, and performance and formulate any required changes. Anecdotal feedback from the faculty included: "students came well prepared not only to the TBL sessions but also to the laboratory dissections"; "students are enthusiastic in interacting with peers"; "students asked excellent clinically relevant questions which encouraged us to learn more clinical information"; "students were more engaged in peer teaching" etc.

## DISCUSSION

In the last few years, medical schools have been adopting TBL in preclinical courses (Siedel and Richards, 2001; Nieder et al., 2005) clerkships and resident training (Hunt et al., 2003; Levine et al., 2004). However, in a "high content" subject such as human anatomy, we had to overcome initial skepticism and concern about covering the content without lectures and with very limited TBL experience. There are examples of success using TBL in high content courses such as organic chemistry (Dinan, 2004), medical gross anatomy (Nieder et al., 2005) and pharmacology (Dunaway, 2005). Other medical human anatomy programs have successfully utilized peer teaching (Pawlina et al., 2006; Evans and Cuffe, 2009). Human anatomy is rich in factual content that the students need to recall for application. Hence, we created focused reading assignments from the anatomy textbook and developed content specific discussion topics based on the readings and laboratory dissection. These topics were discussed during TBL encounters that were supervised by the two course coordinators authors (N.S.V. and D.O.D.).

During our first attempt to introduce TBL in academic year 2004, we piloted the TBL strategy. On the basis of student performances, feedback on TBL, and our own observations, we made required adjustments before fully implementing the modified TBL in later years. We were also encouraged by the positive experiences of Nieder et al. (2005) with their TBL use in medical human anatomy. The performance on departmental examinations (Table 1) showed that students in the TBL curriculum performed better than the students in the previous year's traditional curriculum. These changes were statistically significant ($P < 0.05$) in every case. The class average GPA and MCAT scores for year 2003 were 3.47 and 29.12, and for years 2005–2010 were between 3.51–3.64 and 30.0–31.6. Although there is a modest increase in MCAT scores over the years, we strongly believe that the new pedagogical strategy was a contributing factor to the improved performances. It is possible that TBL improved students' preparedness by encouraging them to keep up with the assignments rather than "cramming" before examinations. Furthermore, peer pressure to contribute to team discussions appeared to enhanced performance. It is generally accepted that with peer teaching and group learning methods, such as TBL, the group will outperform the individual (Table 1). Nieder et al. (2005) made a similar observation that group scores were on average 16% higher than the teams' mean individual average.

We further examined whether the enhanced performance on the NBME Subject Examination was an actual reflection of TBL. Although the average NBME scores in first year courses varied from year to year, in anatomy, the average score showed yearly improvement since the implementation of TBL (Fig. 2). Comparison of students' performances in the NBME Subject Examinations for all required first year courses indicate the advantages of TBL over the lecture based traditional curriculum followed by the other courses (Fig. 2).

There are a number of factors that might have contributed to the overall improved performances on the unit and NBME Subject Examination (Table 1 and Fig. 2). These include: (1) The inclusion of clinical application exercises in "discussion topics" for discussion during team encounters. (2) The improved quality of quiz and unit examination questions written in collaboration with clinical faculty. (3) Incorporation of high quality problem-solving and clinical reasoning questions obtained from various textbooks, Web sites, etc. into our team discussions. (4) Early exposure to preceptorship. (5) Student's critical thinking and problem solving ability were likely improved. We are also entertaining the idea that two free afternoons for self-directed learning in the new curriculum might have contributed to enhanced student learning and performances.

Dinan (2002) reported that in undergraduate chemistry courses the use of modified TBL has resulted in significantly higher grades on standardized tests and fewer failures compared to the same course taught by traditional lecture-based means. One of the major benefits of TBL in that context was retention of academically weaker students. We tabulated the anatomy course grades to evaluate the effect of TBL on stu-

dent performance as a whole and how it might have helped the academically weaker students (Vasan et al., 2008). Following the implementation of TBL, there were fewer failures in the course (number of failures 0–3). Furthermore, proportions of students receiving a pass decreased (39–12%) with a significant increase in number of students receiving high pass (54–73%) and honors (6–12%) (Vasan et al., 2008). Before the implementation of TBL in the anatomy curriculum, 38–40% and 42–47% of the class were in the pass and high pass range respectively. What made the difference? As suggested by Dinan (2002), we believe that the combined use of reading assignments and quizzes served to elicit more students who studied anatomy on a daily basis. Furthermore, to insure individual accountability, individual examination grades are weighted more heavily than the group grades (85–15%). Using TBL, McInerney (2003) reported enhanced long-term retention and critical thinking in an undergraduate microbial physiology course. Our results also support the concept that providing an opportunity to learn in context with clinical cases, and discussing the cases as a team allowed deeper learning, better retention and improved performances.

Over the years, educational psychologists have put forward several theories of adult learning such as cooperative theory of May and Doob (1937); Knowles's andragogy (Knowles, 1968); McClusky's theory of margin (McClusky, 1970); Illeris's three dimensions of learning model (Illeris, 2004a,b); Jarvis's model of learning process (Jarvis, 2006); Tough's lifelong, self-directed learning (Tough, 1967, 1971); Mezirow's transformational learning (1991); and Edgerton's pedagogies of engagement (Edgerton, 2001). TBL incorporates all or most of these principles of adult learning, thus making it "unique" to 21st century pedagogy.

In contrast to TBL, problem based learning (PBL) requires each small group to be led by a faculty facilitator. Currently, however, university faculties in higher education are under enormous pressure to generate revenue through investigative research, often times at the cost of classroom teaching and other pedagogical involvement. As Thibault and colleagues wrote "from a strict economic viewpoint, teaching has, in some instances, been identified as running counter to the fiscal needs of the affiliated medical centers and faculty are being pressured, both directly and indirectly, to reduce their teaching effort" (Thibault et al., 2003). However, even during financially challenging times, medical education can be improved through careful alignment of medical education with institutional mission and management strategies (Lindor et al., 2010). Furthermore, 21st century student approaches to learning demand a new way of teaching (DiLullo et al., 2011) that is efficient, effective, and economical, which paradoxically coincides with the expectations of the administration, society, and government. As the newest pedagogical strategy, TBL importantly addresses both administrative demands during financially challenging times and students' expectations.

It is important to recognize several key components in the TBL strategy: first, teachers clearly identify content the learners are to learn by setting learning objectives, selecting resources, preparing assessment, and providing instruction. Second, learners come prepared for class discussion which includes individual and group "readiness assurance tests". Third, learners tend to be motivated to prepare for class and to perform well within the group. Such preparation is based on self-directed out-of-class study either alone or in teams. Studies have shown that TBL increased learner's engagement and preparedness, improved problem solving, communication and teamwork skills and knowledge outcomes (Thompson et al., 2007a,b; and references therein).

Our approach to utilize TBL allowed us to replace anatomy lectures with "discussion topics" that enabled students to work individually and as a team to learn anatomy. Compared to passive learning associated with traditional lectures, team interactions allow more active student participation that fosters both activation of prior knowledge (Haidet et al., 2002, 2004) and active knowledge construction (Schmidt et al., 1989).

Although our application of TBL has elicited improved student performances on anatomy examinations and created a favorable impression of the anatomy course, questions remain regarding its possible influences on student performances in subsequent clinical clerkships which commonly include working in small groups. Further, whether TBL in the preclinical years affects clinical acumen remains uncertain.

## CONCLUSION

Our experience in implementing TBL has been positive with improved students' performances and faculty satisfaction. We still continue to adjust various aspects of the course in response to students' feedback and our own vision. We observed that students were more engaged in their learning as the teams facilitated active learning as well as peer teaching. Through the evidences shown, we focused on illustrating how TBL can advance academic success through teamwork, trust, mutual respect, interdependence, and attitude towards learning. Post secondary education should be an active learning process that engages students to work in teams. It is a skill that is increasingly becoming vital in the health care profession and emphasized by 21st century employers.

## NOTES ON CONTRIBUTORS

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## ACKNOWLEDGMENTS

The authors acknowledge the New Jersey Medical School University IRB for approval of this study proposal and the Department of Cell Biology and Molecular Medicine for providing support to this project.

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