Exploring Team-Based Learning at a State University

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A small group of faculty at Salem State University representing the disciplines of Chemistry, Finance, Geography, Political Science, and Social Work implemented a Team-Based Learning (TBL) model in their courses to explore its efficacy for increasing student engagement. Surveys were used to collect pre- and post-data from students to determine the extent of change in their perceptions of TBL. The data showed that TBL not only heightened students' self-awareness of their learning capabilities but also revealed that students had an affinity for TBL, often preferring TBL courses over traditionally structured courses.

Keywords: team-based learning, teaching strategies, student engagement, multi-disciplinary research

Increasing student engagement and learning has become an increasingly important focus of faculty at colleges and universities. One instructional strategy that can be used to motivate, encourage, and engage students in the learning process is team-based learning (TBL). TBL is a form of small group collaborative learning, which can also be extended to larger class settings. The concept of TBL was developed, refined, and popularized by Larry K. Michaelsen. Michaelsen (2004) used this instructional strategy as a way to not only contend with large classes but also to promote learning and foster a more actively engaged classroom. TBL emphasizes that students' initial contact with course content should occur prior to class thereby providing a larger amount of class time to apply and evaluate concepts.

Since its development in the late 1980s, TBL has been used extensively by educators who have observed improved performance of their students in areas such as attendance and engagement, as well as learning gains in course content understanding, application, and critical thinking (Michealsen, Knight, & Fink, 2004). After implementing TBL in an evidence-based medicine course, Hunt, Haidett, Coverdale, and Richards (2003) reported that student attendance increased from 50%-60% to 82%-95%. In another study, Kelly et al. (2005) used trained observers to measure student engagement in traditional lecture, problem-based learning, and TBL classrooms. Lecture classrooms showed slight peer engagement (9%) and problem-based learning classrooms showed relatively little engagement with the instructor (11%); whereas, TBL classrooms showed a balance between peer engagement (51%), engagement with the instructor (21%), and time for reflection and writing (28%).

Other TBL studies have shown significant learning achievement. Letassy et al. (2008) implemented TBL in an endocrine system module and observed improvement in student grades and no failing scores on unit tests, compared to the previous semester. When Levine et al. (2004) employed TBL in a third year psychiatry clinical clerkship, they found that students performed better on their standard exams for that area. In a larger study, Koles, Stolfi, Borges, Nelson, and Parmelee (2010) analyzed individual item scores for a class over two academic years, which showed two notable results. First, students performed better on topics that employed TBL than on topics not covered using this approach. Secondly, this effect was magnified for the weakest students. Not surprisingly, however, is that TBL studies have also shown improved outcomes when compared to small group learning. Thomas and Bowen (2011) divided students in an ambulatory medicine clerkship into two cohorts. Each cohort used TBL for half of the units and small team learning for the other half. They found that students performed better on four of the five topics that used TBL.

While the TBL literature report increases in student learning, student perceptions of TBL have been mixed. Hunt et al. (2003) found that students in an evidence-based medicine course reported increased learning and motivation to prepare for class, but expressed a preference for lecture and individual learning. A two-year study by Parmelee, DeStephen, and Borges (2009) found that medical students had a positive experience with TBL, but had mixed feelings about whether TBL improved their learning or grades. And, Thomas and Bowen (2011) found that medical students expressed impatience with the class time used for the readiness testing process.

Recently there has been some evidence of successful implementation of TBL with undergraduate students in fields as diverse as biology (Charmichael, 2009; McInerney & Fink, 2003), economics (Espey, 2012), history (Restad, 2012), literature (Roberson & Reimers, 2012), psychology (Coleman, 2012; Haberyan, 2007; Kubitz & Lightner, 2012), sociology (Hunter & Robinson, 2012), and theatre (Chamberlain, 2012). Unfortunately, the majority of evidence supporting the use of TBL is still focused on medical and pharmaceutical courses with students who are generally capable and motivated. And, it could be argued that these results might not be representative of most college students.

Background

Team-Based Learning (TBL) incorporates four practical elements—strategic formation of teams, readiness assurance, application activities, and peer evaluation (Cestone, Levine, & Lane, 2008; Michaelsen, et al., 2004). These elements, when combined, represent the six best practices of evidence-based teaching, which include cooperative learning, feedback, reciprocal teaching, whole-class interaction, required concept-driven decisions, and visual presentations (Hye-Jung & Cheolil, 2012).

Moreover, TBL provides opportunities for individual and team accountability through readiness assessment tests (RATs) (Michaelsen & Sweet, 2011; Sweet & Pelton-Sweet, 2008) and it promotes a type of social interaction that increases peer accountability, assessment, and evaluation. TBL also links student accountability to a decrease in social loafing, a concern for most instructors when they structure group activities. Student responsibility to each other is also fostered by each student's assessment of his or her team members' performance. This assessment

is a complicated process, as there are numerous criteria that students are often asked to consider. When students recognize that their contribution (or lack thereof) is important to the team's evaluation, it tends to spur active student engagement. While students often are initially reticent to assess and evaluate their team members, TBL research has shown that these roadblocks can be overcome when instructors deliberate with students on the process of peer evaluation and work with students to customize the peer evaluation process so that it is meaningful for them (Cestone, et al., 2008; Hye-Jung & Cheolil, 2012; Watson, BarNir, & Pavur, 2010).

Implementing TBL requires planning and preparation to design each unit within a course around an explicitly stated goal. Though similar to traditionally structured and content driven classes, TBL differs in that courses incorporating this instructional technique require that the goals are behaviorally measureable and that the content is primarily provided through readings which are assigned prior to the beginning of each module. In TBL classes, students take the RAT individually and then in teams. After the RAT is completed, time is spent reviewing the material that was not understood by students, a method, which allows for more efficient use of time. In so doing, little to no time is consumed discussing what students understand; instead, the majority of class time is spent processing the material (Cestone, et al., 2008). Teams work together to apply the concepts and ideas covered in the readings and RATs; and because the majority of class time is spent working on higher level analysis and application of the course material, students in TBL classes develop social and reasoning skills along with knowledge acquisition (Sweet & Michaelsen, 2011; Sibley & Parmelee, 2008).

Method

Study Context

A group of faculty at Salem State University (SSU) joined a faculty learning community. The purpose of this learning community was to acquire knowledge about TBL and study how TBL was being used in other university settings. The learning community met every other week for one academic year, during which time they read and discussed the work of Michaelsen et al. (2004), and numerous empirical and non-empirically based peer-reviewed journal articles on TBL. As a result, the group decided to explore the efficacy of TBL with their students. The students with whom TBL was to be used often did not demonstrate the level of commitment or motivation as the graduate students in medical or pharmaceutical courses with whom the model had been studied. This study began during the 2011 Spring Semester, with data collection ending during the 2013 Spring Semester.

SSU is a public teaching university in Salem, Massachusetts with the primary focus on teaching and learning. SSU offers a variety of liberal arts and professional programs. In 2012, there were a total of 7,143 students enrolled at SSU, with the largest enrollment of majors in business (16.8%), nursing (9.81%), and psychology (7.52%). Of this number, the vast majority (5,777; 80.9%) were undergraduate degree seekers (Salem State Factbook, 2012). While there are substantially more female than males enrolled in the undergraduate programs (61% vs. 39%, respectively), the student ethnic and racial make-up (73% White; 10% Hispanic/Latino; 7% African American/Black; 3% Asian; and 7% Unknown) is generally representative of the state's level of diversity.

The student graduation rates for SSU are similar to other state teaching universities. The four-year graduation rate for cohort years 2002-2008 averaged approximately 18.5%; the graduation rate in five years was approximately 38%; and six years, approximately 43% (Salem State Factbook, 2012). While many of the students enrolled at SSU graduate, the numbers that graduate seem to suggest that there are barriers to graduating in the traditional four-year period. Faculty report that the majority of students work full time. There are a considerable number of nontraditional students attending the university including Veterans, first generation college attendees, and returning adult students who have family obligations.

Although the faculty implementing this study was unable to find evidence of the efficacy of TBL with students similar to those at SSU, it was important for them to examine the effectiveness of the TBL approach with this student population. The purpose of this study was to explore ways in which a select group of SSU students engaged with each other in classes where TBL was strategically used to enhance learning, and to explore their experiences and perceptions of this pedagogical approach.

Participants

The participants in this study differed from the student population at large, particularly in the TBL courses. During the 2010-2013 academic years, 271 to 255 students participated in this study. The participants, mostly female, were undergraduate students in eight courses from four different disciplines (Chemistry, Finance, Geography, and Political Science) and graduate students from the School of Social Work. Additional information about the study participants is discussed under demographic characteristics.

Materials and Procedures

The courses from each of the disciplines utilized the main elements of TBL discussed in the research (i.e., students were placed in permanent teams, instructors provided frequent and prompt feedback, and individual and team RATs were given), with some pedagogical variations. Students in many of the courses had control of the percentage of an assignments' worth within a range set by the instructor. While application exercises were completed in teams, some courses featured mid-term and final exams that were not team oriented.

Data were collected throughout the three academic years. At the beginning of the semester, students completed a pre-survey that registered their expectations about TBL as explained to them. At the end of the semester, students completed a post-survey that measured their experiences with TBL.

The pre-survey asked students about their thoughts on assertions made in the TBL literature, such as many students are often reticent to work in teams (Michaelson, 2004). Using a five-point Likert scale (1= strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree), students were asked about potential concerns. Specifically, students were asked whether they looked forward to working in a team, would feel obligated to complete project tasks, and/or worried that other team members would not pull their weight and do their fair share of work. Students were also asked how they would function in a group, with questions ranging

from whether they thought they would perform adequately in a team to whether they would contribute significantly to upcoming team projects, and whether they thought they would be heard, appreciated, and valued. Additionally, students were asked whether they had previous experience with TBL and if they had any other general concerns.

Because the literature reports that TBL enables students to engage in critical thinking, foster positive team relations, and promote self-understanding (Cestone et al., 2008; Michaelsen, 2004), the pre-survey also asked students to rank their skill level in areas associated with traditional learning outcomes. Using a five-point Likert scale (1 = lowest and 5 = highest), students rated their performance in the following areas: (a) writing, including grammar and building an argument; (b) listening to others and comprehending what is being said; (c) stating personal views and opinions and making sure that they are understood; (d) facilitating a team dialogue, responding to others, and reaching an agreement; and (e) public speaking, including presentation skills. Demographic questions such as class standing (e.g., freshman, sophomore), major, age, and gender were also asked.

At the end of each semester, students were asked to complete a post-survey. This survey was designed to capture students' experiences with the TBL model. The first section of the post-survey asked students to report on their experiences with TBL; then, using the same five-point Likert scale as on the pre-survey, students were asked about their experiences in the TBL course. The post-survey also asked students to rank the same personal skills they had ranked on the pre-survey using the same five-point Likert scale.

Additionally, the post-survey asked students to report on the structure of the TBL course and whether they believed that the major claims of the TBL model were met. A five-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree) was also used for this section of questions. Statements that the students were asked to respond to included: (a) whether the course suffered from a lack of organization; (b) if the TBL course made them feel more compelled to attend class; (c) if the TBL model was compatible with their learning style; and (d) how likely they were to recommend this class. Students were also asked whether, if given the choice to take the same course, they would prefer to take a traditional lecture-based approach or one that employed TBL. For this question, students had the option to indicate whether it depended on the course topic or if they had no opinion.

To explore the TBL assertions of increased levels of energy, improved quality of learning, and better student relationships and cohesiveness (Michaelsen et al., 2004), students were asked to evaluate whether the TBL course was livelier than other classes, whether their interactions with the instructor were better and more frequent, and whether they would keep the friendships they made during the course. The same demographic information asked on the pre-survey was also requested.

Data Collection and Analysis

Data collection began Spring 2010 and ended Fall 2013. Pre- and post- surveys were used to collect the data, which was analyzed using descriptive and inferential statistics. All data collected was aggregated prior to the data analysis.

Results

Demographic Characteristics

Two Hundred seventy-one students participated in the pre-survey and 255 students participated in the post survey. The majority (60.9%) had not previously participated in a TBL course; almost one-third (29.7%) had previously participated in a TBL course; and 9.4% were unsure if they had been involved a TBL course. Table 1 presents aggregated data on course demographics of the study participants. Most were female and most were political science, chemistry, and social work majors. Although participants were not asked about their ethnicity, they were asked their age. Approximately 62% were between the traditional college ages of 18 and 21 years, which is reflective of the university's service to nontraditional-aged students.

TABLE 1

Team-Based Learning Course Demographics

Category	Number (N)	Percent (%)
Gender		
Male	79	47
Female	89	53
Total	**168**	**100%**
Age		
18-19	56	32
20-21	53	30
22-23	28	16
23-25	10	6
25-30	16	9
> 30	13	7
Total	**176**	**100%**
Most Represented Majors		
Accounting	57	23
Biology	44	18
Chemistry/Physics	22	9
Political Science	23	9
Social Work	15	6
Criminal Justice	9	4
Business Administration	10	4
All Other Majors	10	4
Undeclared	56	23
Total	**246**	**100%**

Note: Aggregated data for the 2010-2013 academic years. Differences in "N" totals result from some questions not being answered by the respondents.

TBL data on class ranking and course levels by academic year are presented in Table 2. These data reveal that students were fairly evenly divided among class rankings (i.e., freshman, sophomore, junior, senior), with slightly more being juniors. While the majority of responses obtained in the study were from students enrolled in 100 level courses (41.6% pre-survey; 37.6% post-survey), the second largest group of responses was obtained from students enrolled in 400 level courses (22% pre-survey; 23.6% post-survey). The remaining responses were fairly evenly divided among students enrolled in 200 level (19.2% pre-survey; 20.7% post-survey) and 300 level courses (17.2% pre-survey; 18.2% post-survey). Although graduate courses were included in the study, no graduate students were identified in the data, as the surveys did not include an area for students to indicate if they were enrolled in a graduate level course when the study began. This lacuna accounted for some of the differences between the number of students who completed the pre and post-surveys. During the 2010-2011 academic year, only undergraduate students participated in the study. During the 2011-2012 and 2012-2013 academic years both graduate and undergraduate students participated in the study.

TABLE 2

Survey Results by Academic Year, Class Ranking, and Course Level

	Pre-Survey		Post-Survey	
Academic Year	N	%	N	%
2010-2011	25	9.20	34	13.30
2011-2012	56	20.80	61	62.80
2012-2013	190	70.00	160	72.88
Total	271	100.00	255	100.00
Class Ranking				
Freshman	53	22.18	53	23.45
Sophomore	53	22.18	44	19.47
Junior	75	31.38	78	34.51
Senior	58	24.27	51	22.57
Total	239	100.00	226	100.00
Course Level				
100	104	41.60	91	37.60
200	48	19.20	50	20.66
300	43	17.20	44	18.18
400	55	22.00	57	23.55
Total	250	100.00	242	100.00

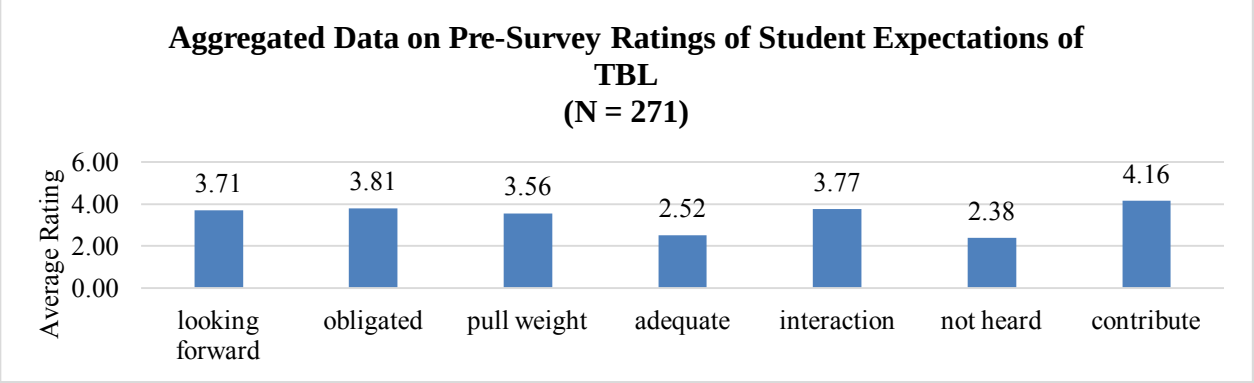
Note: Data on class ranking and course level are aggregated for the 2010-2013 academic years. Differences in "N" totals result from some questions not being answered by respondents.

Student Expectations of TBL

When asked, on the pre-survey, about their expectations and concerns about the TBL course, students responded quite positively (see Table 3). The average responses were neutral or above for the following statements: (1) I am looking forward to working with assigned team-members;

(2) I will feel more obligated to complete the project tasks because I will be working with a team and will have to report to others; (3) I am concerned that other team members will not pull their weight and do their fair share of the work; (4) I am concerned about whether I will be able to perform adequately in a team setting; (5) I am looking forward to interacting with students from my assigned team even though I may or may not know them well; (6) I am concerned that I may not be heard, appreciated or valued by the other team members; and (7) I believe that I will contribute significantly to upcoming team projects.

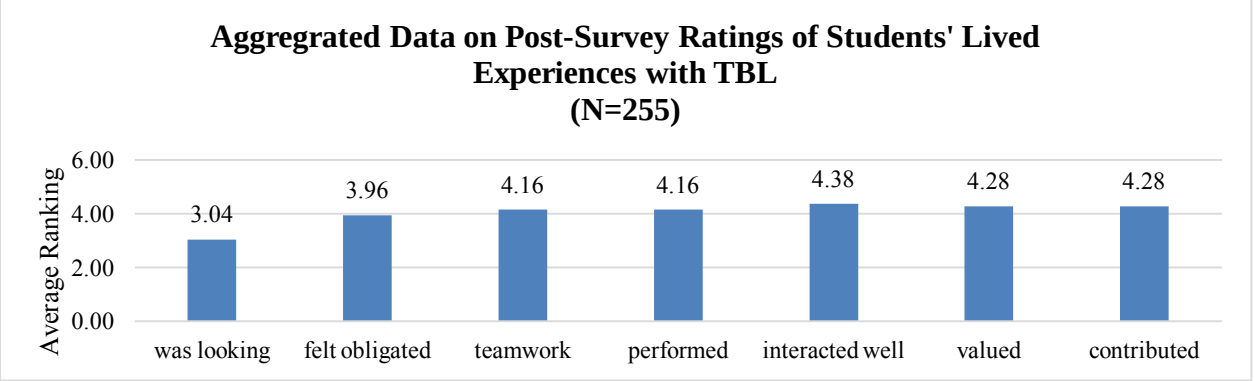
TABLE 3



1 = Strongly Disagree 2 = Disagree 3 = Neither Agree or Disagree 4 = Agree 5 = Strongly Agree

When asked, on the post-survey, about their expectations and concerns about the TBL course (see Table 4), on average students reported feeling mostly positive about their experiences (3.0), except for their recollection of how they anticipated working with their teammates in which they reported feeling neutral. Moreover, most students agreed with the following statements: (1) I felt more obligated to complete the project tasks because I was working with a t eam and had to report to others; (2) Other team members pulled their weight and did their fair share of the work; (3) I performed adequately in a team setting (4) My team interacted well - even though we may or may not have known each other well at the beginning; (5) I was heard, appreciated or valued by the other team members; and (6) I contributed significantly to team projects.

TABLE 4



1 = Strongly Disagree 2 = Disagree 3 = Neither Agree or Disagree 4 = Agree 5 = Strongly Agree

Prior to and after the TBL course, students were asked to rate their skill level in five areas—writing, listening, stating their own views, communicating, public speaking, and facilitating a team. Using a five-point Likert scale, where 1 is the lowest and 5 is the highest rating for skills ranked, the post-survey average was higher than the pre-survey average thereby indicating that students perceived an increase in their skill level. The average rating for each pre- post survey question was compared. For all but one question pair, the differences between the pre- and post survey averages were significant **(**see Table 5**).**

TABLE 5

Aggregated Data on Student Ratings of Skill Level

Skill	Pre-Survey (N=271)	Post-Survey (N=255)	Significance Level
1. Writing, including grammar and building an argument	4.22	4.59	.37*
2. Listening to others and comprehending what is being said	4.88	5.00	.12
3. Stating your own views and opinions and making sure your are understood	4.63	4.89	.27
4. Conversing and communicating and acknowledging others' views	4.79	5.01	.22*
5. Public speaking/presenting to an audience	3.65	4.14	.49*
6. Facilitating a group dialogue, responding to others, and reaching an agreement	4.40	4.72	.32*

*Indicates a significance difference

Students were also asked to consider how the TBL course differed from traditional courses they had taken. For the most part, students indicated that they were pleased with the structure of the TBL course. Using a five-point Likert scale, with 1 being strongly disagree and 5 being strongly agree (average rating, 1.76) students did not agree that the TBL courses were disorganized, which was a concern of instructors using the model because this model was quite different from other pedagogical models being used within their respective departments. On average, the students reported feeling satisfied with the amount of information learned during the TBL course (4.19); they felt they would likely recommend the course to others (4.41); and believed that the TBL classroom had a livelier atmosphere than other courses taken (4.26).

When asked if they had positive feelings about whether TBL was compatible with their learning style, the students' average rating was slightly lower (3.86). When asked whether they were more compelled to attend class, the average rating was 3.91. When asked whether their interactions with the instructor was better and more frequent, the average rating was 3.95. Interestingly, when students were asked if they would maintain the friendships developed in the TBL course, the average rating was 3.73.

Students were also asked to compare the TBL course with traditional courses. A majority (144, 58.3%) preferred the TBL course as opposed to traditional courses (18, 7.3%). Seventy-one (28.7%) stated it would depend on the course topic to determine which pedagogy they would prefer; 5.7% (n = 14) had no opinion.

Discussion

From the findings presented in this study, the following observations can be made. First, the claims put forth in the TBL literature such as students' feeling obligated to contribute to their team, concerns that team members would not participate, and being heard and their views appreciated (Michaelsen et al., 2004), generally matched students' expectations as well as their experience with the course.

At the beginning of each semester, SSU students were receptive to the benefits of the TBL model. On the pre-survey, students indicated that on average they agreed they were looking forward to working in groups (3.71); would feel obligated to complete tasks because they would work in teams (3.81); looked forward to interacting with their teammates (3.77); and, believed they would contribute significantly to upcoming team projects (4.16). Echoing their willingness to work with other classmates, the students generally disagreed that they would not be able to work adequately in a team setting (2.52) or that they would not be heard, appreciated or valued by their team members (2.38). As in the observations made in the TBL literature (Coleman, 2012; Espey, 2012; Haberyan, 2007), the students initially expressed a small but noticeable concern that other team members would not be able to pull their weight or do their fair share of the work (3.56).

On the post-surveys, students further reinforced their positive perceptions of the TBL model. First, TBL promoted student engagement in that students strongly felt they interacted well with their team (4.38). This finding is consistent with other findings in the literature relating to the specific ways that TBL organizes group activities to collectively enhance learning (Levine, et al., 2004; Michaelsen, et al., 2004). Students' claims of making significant contributions to the class (4.28) provide further evidence that TBL is more likely to promote student discussion and analysis of the material than other pedagogical methods. Specifically, students indicated that they felt more obligated to complete tasks because they were accountable to their team (3.96) and that they felt an additional desire to attend TBL classes (3.91). These findings support conclusions found in the TBL literature that structure encourages student engagement and participation (Michaelsen, 2004).

Students also reported positive experiences with TBL. The team structures inherit in TBL promoted students' voice, making their views appreciated and valued (4.28). Compared to other classes, students found TBL courses to be livelier (4.26). These findings, in conjunction with students' responses regarding teamwork and increased learning, indicate that the extra class energy did not detract from their in-class experience. Students' positive report of instructor feedback (3.95) highlights the additional amount of quality contact between students and teachers.

Perhaps the most important finding is that students reported that the TBL courses contributed to the advancement of their learning skills. While it could be expected that listening and comprehension skills would have been promoted as a result of TBL, each of the other skill areas also increased, thus suggesting that the TBL courses played a role in students' positive self-perception of their learning. Notably, the two areas where students initially reported the least amount of confidence (writing, 4.22; public speaking, 3.65); resulted in the highest increase in confidence (+.37 and +.49). These results suggest that the larger group projects, where individuals are often accountable for their own written analysis, provide students ample opportunity to develop their written work. Because students must explain their ideas to their teammates, as well as, articulate them publicly, it is not surprising that students believed they significantly improved in this area. Therefore, it seems logical to speculate that the group nature of the TBL quizzes, discussions, and projects may have contributed to the +.32 increase in students' ability to facilitate group dialogue, respond to others, and reach agreement. It may also account for the +.27 increase in students' ability to express their viewpoints and the +.22 increase in students' capacity to converse with others and acknowledge their views.

The post-survey also highlighted the appeal of TBL for students. Although TBL is structured differently from instructional approaches in traditional courses, students did not feel that the TBL courses were disorganized (1.76). Thus, when instructors make clear course expectations and requirements, students quickly learn the TBL format. As noted in the results, by a nearly 8:1 margin (58.3% to 7.3%), students in TBL courses greatly preferred this pedagogy to teaching methods used in traditional courses. The fact that few students favored traditional courses underscores that TBL is pedagogy students find appealing. Lastly, because the study included courses from five different disciplines ranging from introductory to graduate level courses, it provides additional evidence that TBL can be implemented in a myriad of college settings and course disciplines.

Limitations

As with self-assessment surveys such as the one used in this study, it is impossible to quantify the extent to which the effects of social desirability played into students' responses. While the anonymous nature of the surveys may have limited some bias, it was not possible to completely remove its effects. Because the surveys were specifically designed and crafted for use in this study, they were not tested for their parametric characteristics. Also, cognitive skills were not measured. In addition, the sampling strategy was one of convenience, rather than a randomization or comparison group, thus resulting in an inability to generalize the findings. Another limitation was the variation in the types of students participating the study and student classification levels. While it was the researchers intent to explore how well TBL worked for university students, in general, particularly in disciplines not found or infrequently cited in the literature, it is possible that variations in the types of participants in this study (e.g., classification by class ranking/course level, age, gender) confounded the findings.

Conclusion

Although TBL was initially popularized in classes that taught highly motivated medical and pharmaceutical students, the results of this study seems to suggest that TBL also works with

students who may not be as highly motivated. Student reports of increased engagement and higher likelihood of analysis and discussion within teams suggest that TBL may increase students' metacognition (Rahman, Jumani, Satti, & Malik, 2010; Schraw & Dennision, 1994; Tobias & Everson, 2002). It also suggests that TBL may help students think about what and how they are learning. Therefore, it is reasonable to expect that the development of these learning skills will result in greater learning.

Additionally, students' self-report of an increase in their ability to participate in team discussion and analysis suggest an increase in their perceived self-efficacy. According to Bandura (1993), perceived self-efficacy has an important influence on student academic growth. As such, individuals with higher perceived self-efficacy are more likely to engage in challenging goals and they are less likely to shy away from difficult experiences, including those within an educational setting.

Both metacognition and perceived self-efficacy are qualities that increase a student's probability for academic success, and this study seems to indicate that students attending classes where TBL was implemented experienced an increase in both characteristics. This is important because it suggests that TBL also for students attending teaching universities, such as SSU, as well as students who may not have the educational background or expectations of the students with whom TBL has been most explored. Finally, this study suggests that using TBL with students attending teaching universities may increase their success and set the stage for continued academic achievement in the future.

AUTHOR NOTES

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