
**Categories:** Active Learning, Team Based Learning, Collaboration, Discussion, Science

**Summary**

As do many articles in the S.o.T.L. literature, this study begins by noting the continuing prevalence of lecture as the most common method of knowledge delivery, particularly in large introductory science classes. This, notes the author, remains the case despite growing evidence that lecture is not the most effective means of increasing learning and improving student educational outcomes. In contrast, the author points to a similarly growing body of literature that suggests that active learning techniques promote learning more effectively than traditional methods. In order to add to this research, the author conducted a study involving a comparative analysis of results in two sections of an Introductory Biology course, one of which used lecture as the primary means of delivering knowledge, while the other heavily employed a technique referred to as Team Based Learning (TBL).

The two course sections included in the study contained approximately two hundred students apiece. Both sections were taught in the morning on a Monday, Wednesday, Friday schedule, and none of the students in either course had any prior information pertaining to the pedagogical structure of the section that they signed up for. Students in the lecture section spent class sessions listening to the instructor present information in a traditional lecture format. They were expected to take notes, learn the course material, and to be able to apply that knowledge on a series of exams over the course of the semester.

The TBL section, as might be expected, involved a fairly more complex process. In the second week of the course students organized themselves into four to six person teams. The course presented lectures twice a week, but also weekly assignments supplemented by Readiness Assessment Tests (RATS). These assignments were given in conjunction with every chapter assigned during the semester, which formed the basis of the RATS given at the beginning of each Friday class session. At the start of class on Friday, students received five to ten minutes to complete the RAT; each student reported his or her responses through the use of a clicker. When the allotted time was up, students met in their teams to reconsider the questions they had just answered. After deliberation, the teams used Immediate Feedback Assessment Technique (IF-AT) scratch off forms to retake the RAT. The teams then submitted their responses, and all members of the team received the same score based on their joint responses.

**Results**

In assessing the impact of the TBL format on student learning, the author made use of several elements. First, the author had access to the results of a pre-semester assessment test developed by the department that examined students’ foundational knowledge of content and application of biology concepts. Second, the author compared the results of the several exams, which were identical, taken by students in both sections of the course. Further, in both classes, final grades were determined solely on the basis of the multiple choice exams, including a comprehensive final exam. Finally, the author
compared the self-reported answers to an end of semester survey, which included questions testing biology data interpretation, and responses to the final course evaluation.

According to the author, the pre-semester exams indicated that students in both sections were “virtual identical” in terms of content knowledge and ability to interpret data. Having set this baseline for comparison, the author found that students in the TBL section performed significantly better on all of the exams except for the final, on which both sections had essentially the same mean scores (69.15% in lecture, 69.43% in TBL). Final grades in the course also validated the notion that the TBL approach had positively affected student learning; students in the TBL section received more As and Bs and fewer Ds and Fs than did students in the lecture section. Other factors also substantiated this conclusion. For example, on the end of semester surveys, a considerably greater percentage of students from the TBL section correctly answered the questions requiring data interpretation than did their peers in the lecture section. Further, students in the TBL section self-reported that the approach helped them learn more “effectively and deeply” than they had when taking lecture based courses. Finally, 86% of student comments from the TBL section members indicated positive attitudes towards the approach.

Conclusions

Based on the results of the study discussed above, the author concluded that the Team Based Learning approach had a significant, positive impact on students’ learning outcomes. The author also noted that given the experiences discussed in this article, it seems likely that TBL could be applied in any large class typical taught in a traditional, lecture based manner. Though application of TBL requires a considerable investment of time and effort prior to its implementation, such an investment results in the creation of a learning environment in which students are highly engaged. The application of the TBL did, however, lead to some concerns. Namely, despite the statistically significant improved performance on the first three exams, TBL students fared no better than their lecture class peers on the final exam. This phenomenon could be explained by a sort of diminishing return on the advantages of TBL or a progressive learning curve on the part of students in the lecture based course. The author also noted the potential problem of both workload and perceived unfairness in the team based scoring of weekly RATs. Neither of these concerns, however, seemed to be reflected in the TBL section involved in this study. Students largely agreed with the team based scoring and felt that all members of the team had contributed. Additionally, the increased workload in the TBL section studied did not lead to any increase in the number of students who dropped the course prior to completion.

Applications

This article offers a straightforward introduction to the concept of Team Based Learning, its application in the classroom, and substantial body of evidence to validate its usage. That said, professors interested applying this approach would likely want to consult additional sources prior to doing so due to a somewhat limited level of detail. Moreover, this article clearly reflects an application of TBL in large survey style courses with enrollments in the hundreds. This is not to say that the methodology of TBL applied herein could not be replicated in a smaller class. It does seem, however, that the size of the class involved in this study necessarily limited the type of TBL activities and interactions to those that would
work efficiently in such a large section. In contrast, professors at UDC, given smaller class sizes, could easily employ TBL in a far more varied and creative manner. The article offers a useful framework for conducting similar research at UDC. While one might assume that lecture is less prominent at UDC, given class size, one could still examine the impact of TBL on student learning outcomes compared to a variety of alternative approaches to teaching and learning.

**Citations of Interest**


