

TEAM-BASED LEARNING IN AN INFORMATION LITERACY COURSE

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ABSTRACT

The author implemented team-based learning (TBL) in a credit-bearing information literacy course that meets a general education requirement at the University at Albany, State University of New York. TBL is a highly structured teaching method that includes a number of components not found in a more traditional use of teams in the classroom. It required substantive changes in the course; these changes were notably repaid by the impact on student preparedness and engagement. The main elements of team-based learning are explained in the setting of this course.

INTRODUCTION

The University at Albany has had an information literacy general education requirement since 2000. Students can meet the requirement by taking one of a variety of information literacy (IL) courses: courses offered in some majors; courses in first-year experience programs; or courses through the University Libraries. The author's classroom experience has thus transitioned from providing course-related instruction sessions at the request of faculty members to serving as instructor of record. However, her enthusiasm for teaching IL courses over the last decade has not always been met with equal excitement by her students. Many of them have put off fulfilling this general education requirement until they are close to graduation. Others need a single credit to graduate or to meet student loan requirements. Creating a sense of academic curiosity and excitement in the classroom is always a primary aspiration, but it is one that is not always attainable. Is it possible to meet this goal more reliably? The author's main strategy for building engagement has been to make the course increasingly interactive. Searching for additional ways to motivate students, she attended a workshop hosted by the University at Albany's teaching center, which offered an introduction to team-based learning (TBL). The academy leaders were strong proponents of this highly structured strategy for teaching, providing encouragement to try it despite the radical changes required. TBL is a powerful way to teach, and deserves to be known better by instructors of information literacy credit courses.

TEAM-BASED LEARNING

Team-based learning has its origins in the

teaching of Larry Michaelsen at the University of Oklahoma in the late 1970s, when increasing enrollment caused one of his courses to triple in size. He wanted to continue to use the group activities and assignments that he found helped students to apply concepts, rather than just learn about them (Michaelsen, Knight, & Fink, 2004, p. vii). He discovered that using a large part of class time for group activities worked:

In fact, it was working so well that it accomplished three things that Michaelsen had not even anticipated. First, the students themselves perceived the large class setting as being far more beneficial than harmful. Second, the approach created several conditions that would enhance learning in any setting. In spite of the size of the class, for example, the approach was prompting most students to take responsibility for their own and their peers' learning. Third, Michaelsen was having fun. Because the students were getting their initial understanding of the content through their own efforts, he could concentrate on the aspect of teaching he enjoyed most: designing assignments and activities that would enable students to discover why the subject matter that was so near and dear to him was important to them as well (Michaelsen, Knight, & Fink, 2004 vii-viii).

TBL is a radical departure from the notion of the student as an empty vessel, who only needs to hear the wisdom of a professor during a lecture to learn the course content. Instructors play a very different role, which will become evident in this article. Team-based learning, which is not equivalent to simply using student teams in a course, has

four critical components:

- Team formation and management
- Accountability
- Feedback
- Assignment design

Teams are permanent, and are formed by the instructor, using a method that ensures “that the groups have adequate resources to draw from in completing their assignments and approximately the same level of those resources across groups, avoiding membership coalitions that are likely to interfere with the development of group cohesiveness and ensuring that groups have the opportunity to develop into learning teams” (Michaelsen & Sweet, 2008, p. 10).

Team members are accountable to the rest of their team. In order for a team to function well, each member must prepare for class and must participate meaningfully in the work of the team. From regular attendance to team discussions and problem solving, teams can only succeed through the contributions of every member. Team members must also engage in peer assessment using formal mechanisms. The second type of accountability is that of the team’s performance as a whole, and this takes the form of products that can be compared across teams, with frequent and timely comparisons of the teams’ work (Michaelsen & Sweet, 2008, p. 11).

The feedback given to teams “is the primary instructional lever in TBL for two very different reasons. First, feedback is essential to content learning and retention.... Second, immediate feedback has tremendous impact on group development” (Michaelsen & Sweet, 2008, p. 11). Assignments need to be designed to promote both student learning and the development of the team. Team members need to discuss their work; this

provides an opportunity to learn from one another. Ideally, teams will work on complex problems that allow them to draw upon their preparation for the unit, moving from concept to application. What is surprising to new TBL practitioners is that this deep thinking does not lead to the creation of a new product, such as a paper, where effort and time are put into developing that product, rather than discussing and solving the issue at hand. Instead, team work frequently leads to the selection of the best choice, which might occur, for example, via multiple choice options or development of a ranked list. Additional details will be found in the Reformulating Class Activities section below.

Readiness assessment tests (RATs) are a key component of TBL and one of the products teams use to demonstrate their grasp of the course content. Each unit of a course will have its own RAT, a multiple-choice instrument used to assess students’ preparation for that unit. RATs are first taken individually by each student (iRAT) and then as a team (tRAT). Teams report their performance on the tRAT to the class at large, providing an element of competition that helps to advance team cohesiveness. Only those questions that students still do not understand after team discussion need to be further reviewed in class.

Instructors considering implementing TBL will find a very good overview in Michaelsen’s chapter, “Getting Started with Team-Based Learning” (Michaelsen, 2008). In addition, there is a TBL website with extensive resources for teachers including a link to a listserv on the topic (Team-Based Learning Collaborative, 2011).

LITERATURE REVIEW

TBL has been used in courses taught both in person and online, in very large classes and smaller classes, and in a wide range of disciplines. A number of studies have evaluated its effectiveness as a teaching method in comparison to other approaches. One such study, in an undergraduate nursing course, compared student engagement in TBL and lecture classes, and found a statistically significant difference, with increased student participation in the TBL course (Clark, Nguyen, Bray, & Levine, 2008). Researchers at Baylor College of Medicine compared student engagement across three different methods of instruction: lecture, problem-based learning (PBL), and TBL. They found increased student engagement in both PBL and TBL compared to lecture-based teaching and more learner-to-instructor engagement in TBL (Kelly, Haidet, Schneider, Searle, Seidel, & Richards, 2005). Two sections of an introductory biology course, one taught via lecture and the other with TBL, were studied at the University of North Dakota (Carmichael, 2009). While the team method used was an adaptation of the classical model (i.e., students selected their teams), many of the critical TBL elements were present. Students in the TBL section of the course scored higher on all exams other than the final and showed increased competence on data-interpretation questions. Most students also reported "that TBL helped them learn more effectively and think more deeply than would have lecture alone" (Carmichael, 2009, p. 57).

Problem-based learning, another form of active student-focused learning, has been used in IL sessions (Kenney, 2008; Macklin, 2001; Snavely, 2004). PBL and TBL have significant differences: PBL relies upon

small groups of students who are led by a facilitator, one who generally is not an expert in the subject. The groups work "to solve complex, unstructured problems that stimulate real-world scenarios" that are introduced at the beginning of the learning process (Kelly, Haidet, Schneider, Searle, Seidel, & Richards, 2005, p. 113). TBL also uses small groups, but each group does not require its own facilitator. The instructor for the course, an expert on the topic, is the facilitator when one is needed. Students in TBL prepare outside of class using material identified by the instructor. It is only after this preparation that student teams work on application exercises, which follow from and expand upon what they have learned on their own and through the RATs. There is also interaction and competition between teams in TBL, though generally not in PBL.

Team-based learning is designed to be instituted in courses that meet multiple times. Teams must have the opportunity to cohere, which requires permanent teams in which members work together frequently (Birmingham & McCord, 2004). There also needs to be a way to test readiness to work with the material. Since many IL sessions only meet once, little has been written about TBL in the IL literature. Librarians who teach their own courses, or participate as a co-instructor in courses where information literacy instruction is infused, would be best suited to using TBL. As credit-bearing IL courses are taught at an increasing number of universities and colleges, there will be more opportunities to utilize the method. Metcalf addressed the issue of using team-based learning in library instruction. She provided an overview of the method and showed how it relates to active learning and the advantages and disadvantages of TBL. (Metcalf, 2006). She links TBL to the Association of College & Research Libraries' best practices guidelines

(Association of College & Research Libraries, 2003). However, she did not cite any instances of librarians teaching using the method and a search in April 2011 for more library-related TBL content shows Metcalf's to be the only article on the topic.

IMPLEMENTATION OF TBL IN AN INFORMATION LITERACY COURSE

Impetus for Team-Based Learning

The author was entering her tenth year of teaching UNL205x, a one-credit course taught by librarians that meets the University at Albany's information literacy general education requirement, when she attended an intensive Instructional Leadership Academy offered by the teaching center on campus, the Institute for Teaching, Learning, and Academic Leadership. The goal of this workshop was to introduce teachers to effective teaching strategies and to encourage them to redesign their courses based upon what they had learned. One of the focuses was to design instruction to engage students. The author rarely lectures in class and usually has students actively engaged either in individual or group-based discovery learning. However, she was not familiar with TBL, one of the topics of the two-day workshop. The concept was intriguing but also threatening. Despite all the active learning she had built into the course, she would need to make significant changes in order to incorporate TBL. With the first fall section of the course starting just a few weeks later, she did not feel as if there was sufficient time to understand fully and assimilate TBL's tenets, let alone make the necessary changes. But during that first fall quarter, having had more reflection time, the author realized that it would be possible to make sufficient changes to migrate to TBL during the second quarter. Accordingly, she

put most elements into place for the late fall 2009 section. Implementing most, but not all, of the elements of TBL during its initial use is not uncommon, as reported by instructors at the author's institution and as mentioned by some members of the TBL listserv.

Nuts and Bolts

Using TBL in a course that has just seven two-hour class meetings provides some challenges, including having sufficient time for team bonding and maturation, deciding on the timing of the RATs when almost every class begins a new instructional unit, and scheduling peer assessment. Without other courses as models for addressing these issues, the author had to rely upon her teaching experience to determine which adaptations might work. TBL included a number of unfamiliar elements, leading to the decision to rely upon trial and error.

Some of the immediate changes needed to institute TBL included:

- Deciding what constitutes each major instructional unit in the course
- Revising assignments so students would learn key concepts before attending class
- Reformulating class activities where needed to build upon students' new knowledge and to enhance team cohesion
- Moving from weekly quizzes to RATs
- Developing a mechanism for administration of a sample iRAT and tRAT
- Revising the syllabus and course management system to reflect all these changes
- Making time in the first class meeting to organize teams

Later changes included adding:

- The team assessment process
- Course assessment, to gauge students' reaction to TBL

Each change is discussed below in more detail.

Developing Instructional Units

In semester-long courses, a new module might start every three or four weeks and would begin with the readiness assurance process, testing students' knowledge of key elements. Hence, there might be just three or four RATs administered throughout a full semester. Subsequent to the RAT, each unit would include a variety of team and intra-team activities to increase students' ability to apply what they are learning. In UNL205x, with only seven class meetings, each weekly meeting other than the first and the last introduces a new unit. After reviewing the course topic and their placement, the author decided no changes were needed for TBL. The first three of these modules have significant material for students to learn outside of class, so RATs are used every week from class meetings two through four.

Assignment Revisions

The expectation that students will come to class ready to engage with new material from the assignments, without a lecture or other class content on a subject, is a critical element of TBL. While UNL205x has always included assigned readings and tutorials, student preparation has varied, and the most important concepts would be addressed during class. With the course transformation, the author needed to analyze what students were expected to learn through outside-class work and what new topics were being introduced during class.

As a part of the readiness assurance process, the goal was for students to come to each class knowledgeable about the topics with which they would be engaged. The assignments had to be adjusted so that all, rather than just some, key concepts were included in students' preparatory work, and, correspondingly, the basic introduction of these topics had to be removed from in-class content.

This introduced a mental hurdle that took some time to overcome: Was an instructor not abrogating his or her responsibilities by no longer directly contributing significantly to students' understanding during class? An example of this change involved learning about Boolean operators. The original assigned reading mentioned them, but students were not expected to come to class well versed in their use. The author would show a site in class that visually emphasized how each operator works (Schrock, n.d.), and it was through this activity that students were expected to learn how to use the operators. With TBL, students are assigned a more comprehensive reading (University Libraries, University of Nevada, Reno, 2010), and they understand it is their responsibility to come to class knowing the material. Even without much lecture during class in the author's previous teaching method, she was relying on brief periods of information transmission to teach important material. Yet students often did not recognize this as critical material that they needed to learn. With TBL, students were learning during class, and the instructor's defection from the role of purveyor of information was actually a positive change and not a dereliction of duty.

Reformulating Class Activities

Team-based learning requires application activities or exercises which teams complete during class. These activities are a formal

part of TBL and are crucial for successful implementation of the method. Application activities should meet what are called the 4 S's: significant problem, same problem, specific choice, and simultaneous reporting (Sibley & Spiridonoff, n.d.). Teams all work on the same question or problem; the activity should be structured in such a way that students do not work individually and then pool their results. Therefore, these problems should not involve activities where the product is an extensive enterprise, such as a paper or a report, because students would be inclined to work on individual pieces in order to complete it. The goal of the activities is to have students work with the material they learned during the class preparation process, grappling during their discussions with complex problems that extend their understanding. These activities often take the form of making specific choices. Students might be asked to identify examples, make lists of key elements, make decisions, or in some other way respond to a focused task.

The application activities the author observed when learning about TBL seemed to concentrate on key concepts in a field, and she wondered how activities might be developed for a course with a skills-based component. It transpired that existing activities which involved searching for information through tools such as the online catalog, databases, and Web search engines were suitable to be adapted as application exercises. Students might also analyze and synthesize what they have learned and put it in the form of advice for novice researchers. For example, students might work on a discovery exercise individually. They might explore both Academic Search Complete and a second subject-specific database while searching their own topics for the cumulative course project, a research guide. Next, they could work in their teams to

extract critical elements of the search process, deciding on the most important ones, and then report their advice by simultaneously posting flip chart sheets on the wall. Teams may be given the opportunity to comment on the work of other teams, and the instructor might initiate investigation into problematic responses through queries to the whole class. The author has found that asking teams to provide the three most important pieces of advice to novice researchers is an effective mechanism for engaging students in higher level thinking skills, a key component of TBL. It also encourages them to reflect upon their new knowledge and how it has changed their ability to find pertinent information sources. The team discussion and the accepted expectation that substantive work will be accomplished through this process are critical for the quality of the results. It is up to the instructor to decide whether a particular team activity will be graded.

From Quizzes to RATs

One-credit classes are rare at the University at Albany, and coupling students' perception that such courses need not be taken seriously with the fact that UNL205x is a general education course that most students should have taken earlier in their academic program can lead to reduced attendance and motivation. The author started giving weekly quizzes in the course many years ago and found that they worked well in encouraging students to attend class. Some students also remarked that they appreciated this mechanism for checking their mastery of the course material.

What distinguishes TBL's readiness assessment test from a simple quiz is the process by which students take the RAT. This is done first as individuals (iRAT), then—without seeing the correct answers—

the team takes it collectively (tRAT). The RAT is a short multiple-choice quiz. The method used for feedback on the tRAT is the key to the team-building process. An excellent instrument is manufactured by Epstein Educational Enterprises, which resembles and functions like a lottery ticket: the user scratches off a coating on the paper to reveal the winner. For the tRAT, students are required to debate within their team which answer is best, reach consensus, and then scratch off the correct answer. If they are correct, this is revealed immediately when the coating is removed. If they are not, they continue until the scratch-off card indicates, by elimination, the correct answer, as partial credit is given in order to motivate teams to continue to work to the correct answer. The effect on students is electric.

Instructors without access to these scratch-off cards have other options which include providing teams with answer sheets, using class discussion, or quickly hand-grading team tests (Michaelsen, Appendix A, 2004, pp. 225–226). The structure of immediate feedback (reward or correction) forces the team to think carefully before answering. The instantaneous sign of success or failure contributes to the development of an authentic team dynamic within each group.

Creating good RAT questions is not easy. They have to be structured as multiple choice items in order to convert student thinking into specific decisions. This decision-making is critical to the development of effective team behavior. Before TBL, the author had rarely used multiple-choice questions in quizzes, and when she did, the items were not the challenging constructions required by TBL. She therefore needed to create the RATs from scratch, writing choices that truly encouraged reflection and discussion, rather

than just recall of facts (see Appendix A for examples of RAT questions). In addition the RAT had to be designed so that each correct answer aligned with the proper location on the scratch-off card.

When developing RAT questions, it is imperative to keep in mind that simple recall of facts is not the primary goal. Some of the earlier quiz questions were developed simply to determine whether or not students did the reading or paid attention in class and understood and retained the material. However, these questions certainly would not encourage much discussion during the tRAT. Question number five from Appendix A, “Which of the following information source groupings contains only primary sources?” can serve as an example of the process of developing a RAT question. In the traditional quiz, the question was more basic and asked students to identify which of four choices was the primary source. The quiz took place in the next class meeting following the one containing the discussion of primary sources, so the correct answer was frequently mentioned in the previous class when students provided examples, and was easily identified by attentive members of the class. The new question involves answers that have multiple components, thus increasing the complexity of the decision-making. It provides scope for team discussion and finer distinctions than the quiz question. It also might provoke students to dispute the answer through the appeal process described below and hence review the material even more attentively. Asking students to select the best response on a RAT is a good option, in which case most, if not all, of the answers have some degree of validity.

The final part of the RAT process is the appeal. At the end of the tRAT teams are allowed to make written arguments

challenging the validity or accuracy of the RAT, and for this process appeal forms are provided upon request. For example, a team might challenge the factual accuracy of a question, in which case they must provide a citation from the readings buttressing their case. Another team might challenge the wording of a question, and provide a substitute that substantially improves on the original. All of these elements engage students to take much greater responsibility for their learning and to begin recognizing the value of their colleagues in the learning process.

As an instructor who tended to scorn multiple-choice questions in the past and who leaned toward short-answer quizzes, the author has come to realize that using this type of question within the TBL setting is not for the purpose of summative assessment, but rather a means by which the team can make decisions, build trust, and learn in the process. The energy level in the classroom during a tRAT is palpable, and the discussions are a joy for a teacher to behold. The students are engaged, even fighting for their choices, and backing up those choices with well thought-out reasons. Returning to question five in Appendix A, one recent team of students appealed when they discovered that the correct answer was A. They made the excellent point that if the doctoral dissertation was in the sciences, it is possible that it is indeed a primary source, and therefore response C would also be correct.

Sample RATs

Students need to have an opportunity to experience a RAT before they are held accountable both individually and as part of their team. Using a suggestion from the workshop and found in the literature (Michaelsen, Getting Started, 2008, p.39), the author's sample individual and team

readiness assessment tests in the first class period are based on the course syllabus (<http://library.albany.edu/usered/unl205/Instructor%20Directory.htm>). Students are given ten minutes to spend reading the syllabus, after which they take first the iRAT, followed by the tRAT. The teams engage in serious discussion about correct responses before using the scratch-off cards to test each response. This process helps students become familiar not only with the structure of the RATs, but also with their teammates, and laughter often punctuates the more earnest conversation. As teams finish, they post their scores, which are shared with the entire class. They also identify those items they did not answer correctly, so that the instructor can quickly see which items might need more discussion. These post-RAT discussions generally involve more students, arguing from a more informed background, than students defending a quiz answer. Teams become competitive as they are able to see how other teams performed, but the author has not observed this competitiveness become so intense that it was detrimental to learning or to the functioning of the teams. Only upon completion of the RAT process do students learn that the syllabus RATs were just for practice. They also learn about the appeals process at this point. Later in the course, if a team does appeal, discussion about problematic items can be postponed until after the appeal is resolved. If students succeed in their appeal, only members of those teams that appealed will receive the grade adjustment.

One concern the author had when introducing the appeals process was that students would want to appeal every wrong answer, or non-appealing teams would want to benefit from the work of another team's appeal, and that petty bickering would ensue. TBL practitioners have developed

ways of discouraging this type of problem, such as responding to appeal requests between class periods via an electronic message, but the author has found that teams appeal rarely, and that this component of TBL is not an area for worry.

Revising the Syllabus and Course Management System

After the intellectual challenge of pondering and then altering so many aspects of the course, the prospect of revising the syllabus and supporting technologies seemed clear-cut. However, this was a misjudgment. Revising assignments and mentioning TBL were insufficient. The author needed to decide how to frame the information about TBL in order to clarify the basics, make the reason for using it motivational, and implement it in a non-threatening manner. The allocation of grade points had to be rethought. Participation was always an important part of the grade, but is participation credit useful, or even necessary, when students are engaged in team work with RATs that count towards a significant portion of the grade? The earlier version of the course integrated both a class blog and an electronic reserve system for readings. How would use of a blog fit with TBL? When the author first started using TBL, she employed an electronic reserve system, ERes, and making sure the changes she had made were reflected in ERes was time consuming but simple. However, when she switched to Blackboard, new questions arose. Could she use system features for the team assessment process? Should she form team groupings within the system? How would they be used? Making use of the capabilities of Blackboard to enhance the TBL environment is a continuing learning process.

Team Formation

The tenets of TBL stress that team

formation should not be done randomly, nor should students be able to form their own teams. Instructors should determine if there is a particular characteristic or skill that they would like to distribute amongst the teams. Accomplishing team formation during a busy first class meeting seemed daunting. One suggestion made at the workshop is to include students from different disciplines in each team. Another potential factor is class year, to ensure that each team has a mix of lower-level and upper-level undergraduates. Courses containing students who are more homogenous might consider using criteria such as work experience, courses taken in the field, cultural background, or other factors that might prove to be an asset or a liability (Michaelsen, Getting Started, 2008, p.39). It is also important to make sure that students who might form subgroups (friends, students who are dating, etc.) not be included in the same team. Since the author had been told by others that dividing by discipline accomplishes what is needed and can be done quickly, she has students form lines based on broad discipline (humanities, social sciences, sciences, and business) and then count off by fours, to form four teams. As soon as teams are created, the instructor gives students just a minute or two to introduce themselves, and to select a team name. There is often much laughter and groaning during this process; this immediately helps to break the ice between team members. Some teams are creative in their selection of a name, while others inevitably use the number by which they counted off (Team #2, for example). The author was initially very skeptical of the recommendation to form groups of five to seven members and was inclined to have three or four people in a team but has come to see the wisdom of larger teams. Birmingham and McCord cite research that indicates the factors important for team size:

“difficulty of the tasks to be performed,” which indicates the need for a larger team, balanced by “the relatively short duration of academic terms [which] tends to set an upper boundary to the ideal size group” (Birmingham & McCord, 2004, pp. 74–75). Groups that are too large discourage all members from participating in discussions (Birmingham & McCord, 2004). Sections of UNL205x usually have 23 students, who are best divided into four teams. Because of these larger teams, attrition through absence or withdrawal from the course has less of an impact.

Peer Assessment

Teaching one section of the course without the peer assessment component alerted the author that it is important to add this formal mechanism of student accountability to the team. Initially she used only a final peer assessment, which was worth 5% of the course grade, though as she became more comfortable with peer assessment, she increased that percentage to 12%. Using a form distributed near the end of the course, students assess the strengths of their teammates and note which elements need to be improved. They then give other members of the team a score, working from a uniform number of points (for example, members of teams with four members have 15 points to distribute, while teams with five members have 20 points). Points may not be distributed evenly, requiring students to make distinctions about the value of the contributions of team members. There is also a place for students to make general comments. Students complete this for submission in the next-to-last class, giving the instructor one week to compile the comments about each student, and to compute each student’s points. Each student receives his or her peer feedback sheet just before the end of the last class.

The author recently adopted a formative peer assessment halfway through the quarter which serves several purposes. Students are able to practice writing focused comments about specific positive and detrimental behaviors. These comments allow their teammates to learn about their strengths and weaknesses in the team setting, enabling them to make changes before the final, summative assessment. And lastly, because students are graded not on their teammates’ assessment of their work, but rather on the quality of the comments they provide for others on the team, they feel far less anxiety about the process, because they are in control.

Student Feedback and Course Assessment

It is extremely beneficial for instructors using TBL to get feedback from students. This is especially true when first starting to use the method because it provides the opportunity to see the method validated, as students acknowledge benefits from team work. It also allows the instructor to make adjustments and to address areas of concern with the students. The teaching center at the University at Albany offers a mid-term survey service in which they provide an instrument to gauge how students feel about a course. They provide the results quickly to give instructors a chance to make changes for the remainder of the term. The director of the teaching center adapted the standard mid-term TBL course survey for the shorter quarter course (Institute for Teaching, Learning and Academic Leadership, n.d.). Beyond answering a number of Likert-scale questions, students have an opportunity to indicate what they think is going well in the course, thereby facilitating their learning; they can also provide suggestions for change. The positive feedback the author has received about the use of teams has enhanced her appreciation of and faith in the

teaching method. She also believes that the questions about working in teams caused some students to reflect on its effectiveness and to recognize its benefits.

Those instructors interested in implementing TBL who do not have mid-term survey services available might accomplish the same result by asking students to address some key questions during an in-class free-writing exercise. The standard assessment form that students fill out at the end of each course does not include any TBL-specific questions, although students do have an opportunity to add comments following the generic questions. Those responses that address TBL have been generally positive. While the data comparing results from this tool pre- and post-TBL are still preliminary, they accord with the general upward trend of student satisfaction with the course since the author instituted TBL.

WHAT DID NOT CHANGE WITH TEAM-BASED LEARNING

A number of key components of the course did not change with the adoption of TBL. The author's teaching style was never based on lecture, so the transition from the active learning methods she has always employed to TBL was not so radical a change as it would be for instructors whose primary mode of teaching is lecture-based. While she needed to learn the strategies of TBL and methods for implementing what others have found to be successful, she was already accustomed to students working through problems in groups. This mitigated some of the angst that might have occurred when adopting TBL. In addition, the instructional units remained the same since they were already distinctly divided by the day on which they were taught.

Students still select their own topics for the

cumulative course project, a research guide that is ideally tied to work done in another course. Students submit draft assignments each week towards this project based on outside class assignments and two in-class exercises. However, the author does use the team structure as a way for students to obtain feedback on the citations and annotations before submitting them. This activity has had only mixed success, and part of the reason may be that it does not fit neatly into the tenets of TBL. Pairs of students have performed this critique as, or more, easily than teams so the current structure does not make use of the power of TBL and will need revisions. Given the disconnect between the team structure and individual student research guides, the author plans to migrate to team topics with the resulting team guides developed as wikis. There is a continual process of rethinking existing course elements and revising them so that they work in accord with TBL. The scaffolding mechanisms used in the course prior to adopting TBL remain, including a set of criteria for annotations, and an editing checklist and a grading rubric for the research guide.

Students continue to participate in the university-wide course evaluation process, mentioned earlier, that occurs at the end of the course. However, since this instrument is not TBL-specific, the mid-term survey administered by the teaching center generally provides more useful feedback that identifies elements that need to be changed.

WAS THE TRANSFORMATION A SUCCESS?

Student Reaction to TBL

Students discuss course topics, knowledgeably defend their positions,

search for more information, and suggest strategies for other students to use and materials for them to read: what a pleasure it is to see this happening in the classroom! Students have indeed taken responsibility for their own learning, and they take satisfaction in helping their team members learn also. In the dozens of sections of the course the author taught before adopting TBL, these behaviors occurred only in the best of the classes. Now they occur far more frequently, which is fantastic.

The author has not encountered any overt challenges to the use of TBL in the seven sections of the course in which she has used it. There has been initial skepticism amongst some students, but when they learn that most students will score better on the team RATs than the individual ones, these skeptics come to embrace the team concept. This does not mean it is the learning method of choice for all students, but they do

participate effectively. The developing team spirit also helps to remove resistance. Some teams cohere better than others. Regular attendance and commitment to the team are crucial for this process. In one section, the author was astounded when one team of students expressed concern when the RATs ended. They wanted to make sure that they would continue to have the opportunity to work on activities with their team members.

The mid-term survey results provided in Figures 1-4 show student support for TBL. Figures 1 and 2 show how students responded to the mid-term survey item, "Collaborative/team learning in this course contributes to my learning." Figures 3 and 4 show the responses to "Working with others is challenging me to think and examine others' ideas." While there is no comparable data available for the teaching method the author used prior to TBL, the responses

FIGURE 1: STUDENT RESPONSE TO MID-TERM SURVEY SPRING 2010 Q2,
N=18

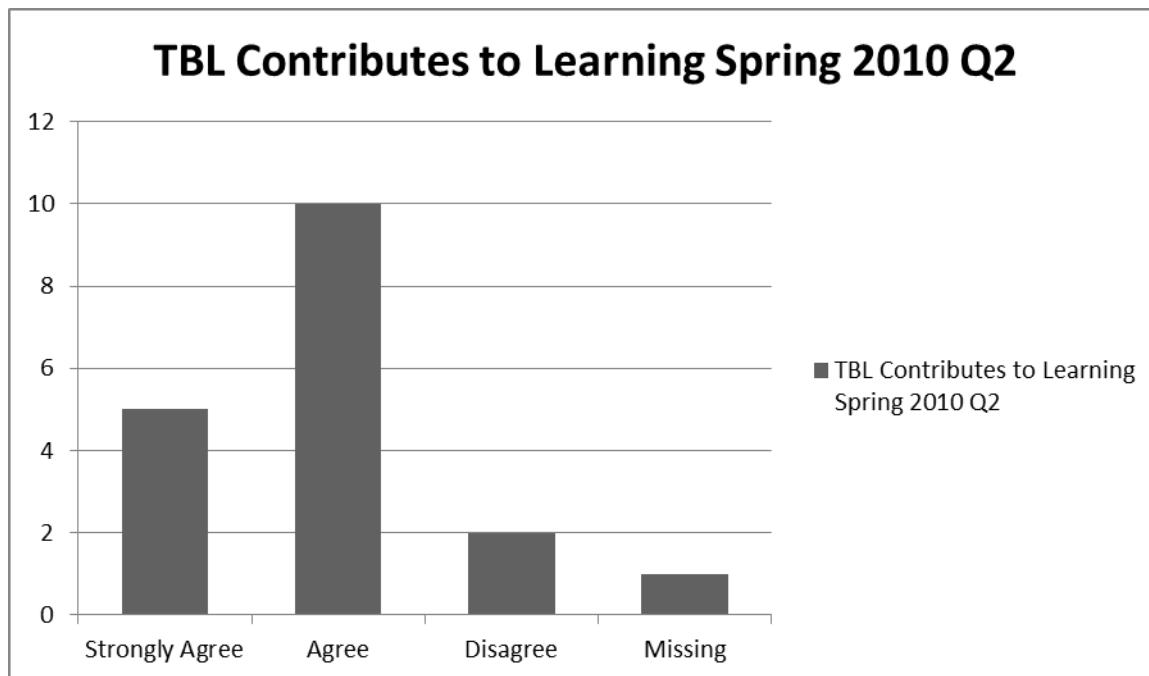


FIGURE 2: STUDENT RESPONSE MID-TERM SURVEY FALL 2010 Q1, N=17

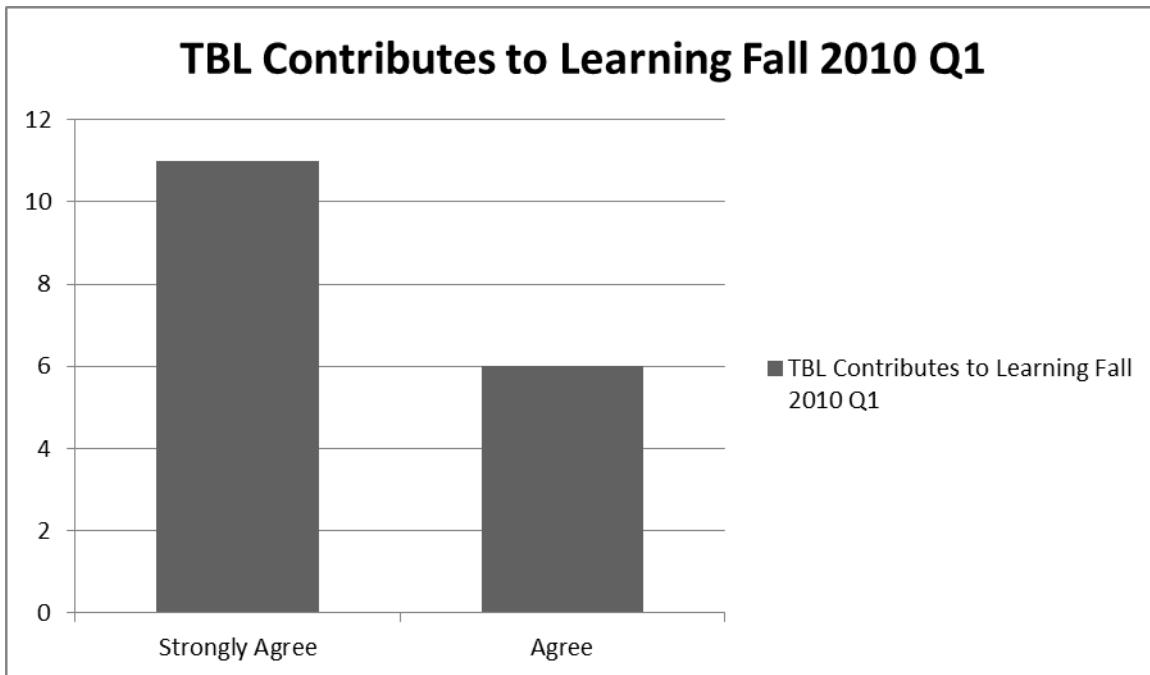
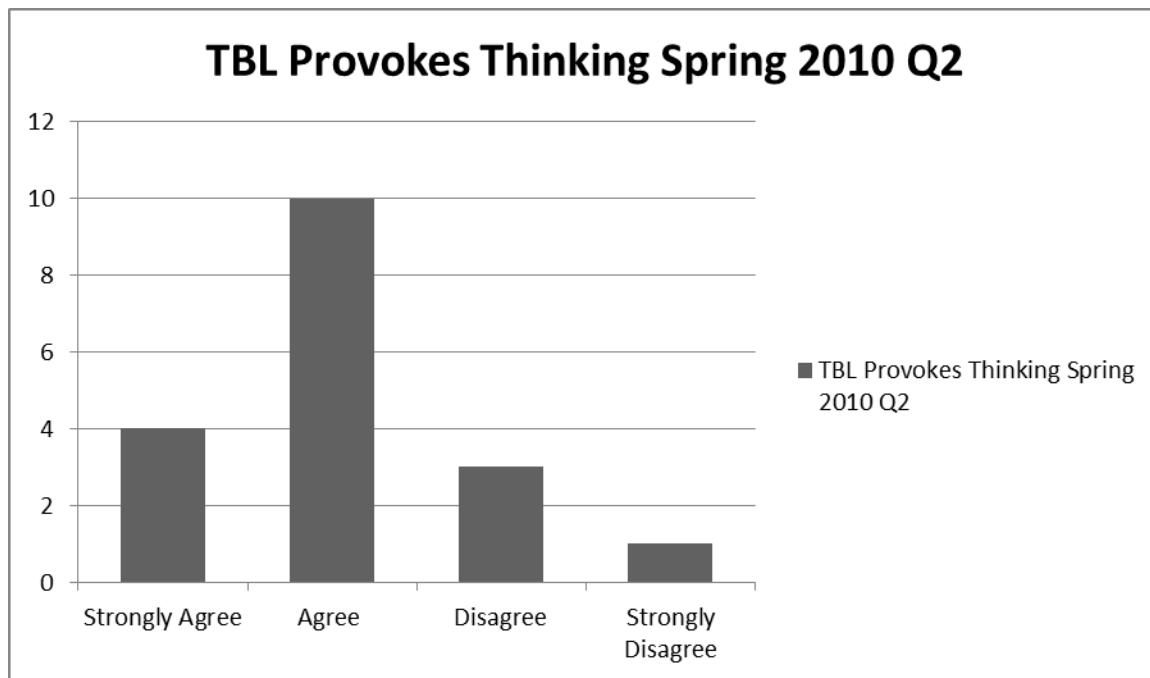
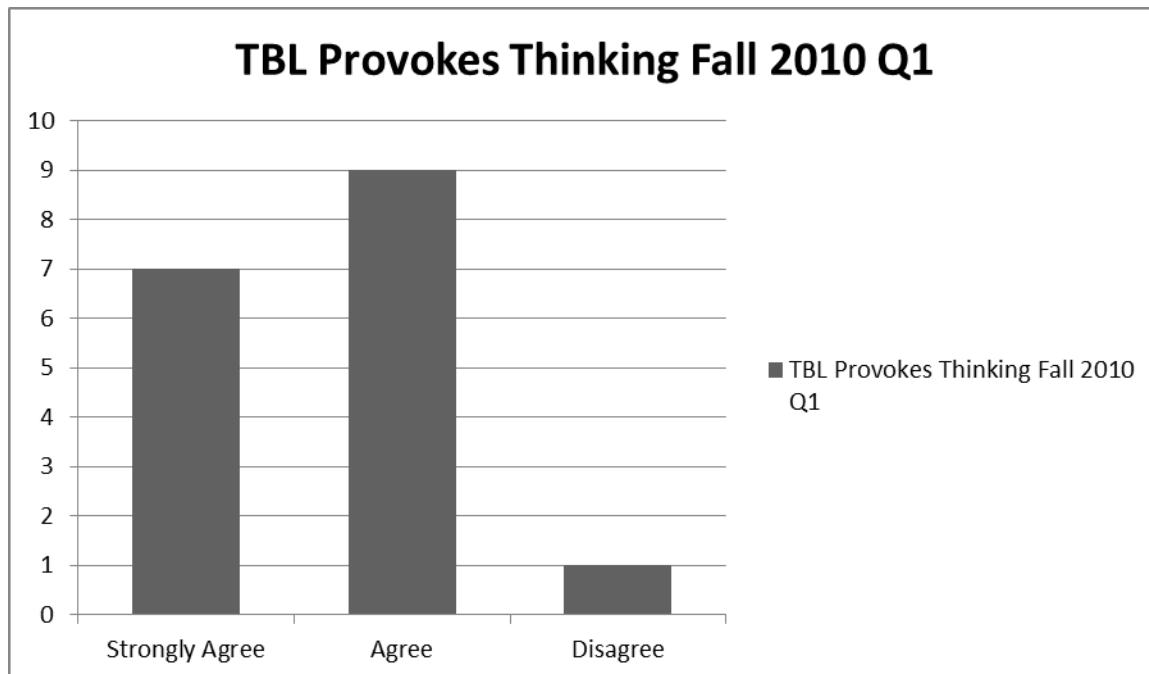


FIGURE 3: STUDENT RESPONSE TO “WORKING WITH OTHERS IS CHALLENGING ME TO THINK AND EXAMINE OTHERS' IDEAS” MID-TERM SURVEY SPRING 2010 Q2, N=18



**FIGURE 4: STUDENT RESPONSE TO “WORKING WITH OTHERS IS CHALLENGING ME TO THINK AND EXAMINE OTHERS' IDEAS”
MID-TERM SURVEY FALL 2010 Q1, N=17**



show students' strong affirmation of the success of the method.

Students wrote a number of comments on the mid-term survey in response to the question about what helps them to learn:

- The group work and constant feedback
- Group work with teams and discussions
- I think the group work is helping me greatly
- Group based learning is positively allowing me to express/exchange ideas freely. I can voice an opinion and know that others will not degrade my thoughts

Students are also able to provide specific

suggestions for the instructor, and there have not been any pleas to discard TBL. In fact, two responses on the fall 2010 survey urged the instructor to “keep the team projects” and to “keep doing what [you are] doing.”

PAYOUTS AND CHALLENGES

While implementing TBL on such a short time-frame was intimidating and just a touch chaotic, the author is delighted that she took the plunge. Almost all students now treat the course seriously, and most, if not all, are coming to class fully ready to grapple with the questions on the RATs. There is a consistently high level of energy in the classroom, and the work that teams produce is of good, often excellent, quality. The author has begun to use the results of their reflection and deliberation in various ways to help students who are not in the

class learn. Some of their flipchart pages containing advice to other students have been hung throughout the library, and, in one case, tips for users of a new tool were gathered from the teams and compiled into a single help guide by the department's graduate student and presented on the web (Students of UNL205x, 2010).

There is nothing more gratifying than walking around the classroom while teams engage in discussion, hearing them analyze fine points about the course material and defend their positions with evidence. This situation is common with TBL, as reported by TBL listserv members and the increasingly large cohort of TBL practitioners at the author's institution.

Part of the difficulty in redesigning the course came from developing the RATs and application exercises, but another significant part involved the author wanting to be certain that she really understood the essential components and what role they played. It almost felt like learning a new language initially, with the uncertainties, the nervousness, and the self-consciousness that one feels when trying to speak another language. However, TBL was such a positive experience that she began feeling much more comfortable with the method by the second time she used it. There will always be adjustments needed, but that is not unique to the TBL method of teaching. As team-based learning is adopted by more instructors, there will be additional best practices identified and more research study results to pursue. The effort to learn this language of teaching has paid off handsomely in the change in students' attitudes and in their learning.

USE OF TBL IN INFORMATION LITERACY INSTRUCTION

A number of University at Albany faculty members are now using TBL, and a significant percentage of them declare that they could never go back to teaching without it. Their desire to communicate their enthusiasm with others is palpable. Building such a community amongst teaching librarians would benefit both librarians and students. It is advantageous to share methods, experiences, RAT questions and the sources they were drawn from, and application exercises. While TBL is a natural fit for credit-bearing IL courses, creative librarians might find ways to apply team-based learning elements in course-related single sessions. (For one example of an application exercise used in a single session, see Appendix B "Team-Based Learning Worksheet.") Teaching librarians strive to provide effective instruction, and TBL is a powerful method to do so. This article has just touched on key elements of TBL as applied in one course over a number of quarters. The author encourages interested teachers to delve into the literature of TBL and to share their results as they start to use it.

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REFERENCES

- Association of College & Research Libraries. (2003, June). Characteristics of programs of information literacy that illustrate best practices: A guideline. Retrieved January 10, 2012, from Association of College & Research Libraries: <http://www.ala.org/acrl/standards/characteristics>
- Birmingham, C., & McCord, M. (2004). Group research process: Implications for using learning groups. In L. K. Michaelsen, A. B. Knight, & L. D. Fink, *Team-based learning: A transformative use of small groups in college teaching* (pp. 73-93). Sterling, VA: Stylus.
- Carmichael, J. (2009, March/April). Team-based learning enhances performance in introductory biology. *Journal of College Science Teaching*, 38(4), 54-61.
- Clark, M. C., Nguyen, H. T., Bray, C., & Levine, R. E. (2008, March). Team-based learning in an undergraduate nursing course. *Journal of Nursing Education*, 47(3), 111-117.
- Institute for Teaching, Learning and Academic Leadership. (n.d.). *ITLAL Services*. Retrieved February 3, 2011, from University at Albany, SUNY: <http://www.albany.edu/teachingandlearning/services/reqSurvey.shtml>
- Kelly, P. A., Haidet, P., Schneider, V., Searle, N., Seidel, C. L., & Richards, B. F. (2005). A comparison of in-class learner engagement across lecture, problem-based learning, and team learning using the STROBE classroom observation tool. *Teaching and Learning in Medicine*, 17(2), 112-118.
- Kenney, B. F. (2008). Revitalizing the one-shot instruction session using problem-based learning. *Reference & User Services Quarterly*, 47(4), 386-391.
- Macklin, A. S. (2001). Integrating information literacy using problem-based learning. *Reference Services Review*, 29(4), 306-313.
- Metcalf, S. (2006). Will team-based learning mesh well with library instruction? *LOEX Quarterly*, 33(3), 6-8.
- Michaelsen, L. K. (2004). Appendix A: Frequently asked questions about team-based learning. In L. K. Michaelsen, A. B. Knight, & L. D. Fink, *Team-based learning: A transformative use of small groups in college teaching* (pp. 209-228). Sterling, VA: Stylus.
- Michaelsen, L. K. (2008, Winter). Getting started with team-based learning. *New Directions for Teaching and Learning* (116), pp. 27-50.
- Michaelsen, L. K., & Sweet, M. (2008, Winter). The essential elements of team-based learning. *New Directions for Teaching and Learning* (116), pp. 7-27.
- Michaelsen, L. K., Knight, A. B., & Fink, L. D. (Eds.). (2004). *Team-based learning: A transformative use of small groups in college teaching*. Sterling, VA: Stylus.
- Schrock, R. (n.d.). *The Boolean machine*. Retrieved February 3, 2011, from <http://kathyschrock.net/rbs3k/boolean/>
- Team-Based Learning Collaborative. (2011). Retrieved January 10, 2012, from <http://www.teambasedlearning.org/>
- Sibley, J., & Spiridonoff, S. (n.d.) What is

TBL? Retrieved January 10, 2012, from Team-Based Learning Collaborative: <http://www.teambasedlearning.org/Resources/Documents/TBL%20Handout%20Aug%2016-print%20ready%20no%20branding.pdf>

Snavely, L. (2004). Making problem-based learning work: Institutional challenges. *portal: Libraries and the Academy*, 4(4), 521-531.

Students of UNL205x. (2010, September). *Guide to eDiscover*. Retrieved February 3, 2011, from University Libraries, University at Albany, SUNY: <http://library.albany.edu/usered/eltools/ediscover.html>

University Libraries, University of Nevada, Reno. (2010, October 26). *Using AND, OR, and NOT (Boolean Operators)*. Retrieved February 3, 2011, from University Libraries, University of Nevada, Reno: <http://knowledgecenter.unr.edu/help/using/booltips.aspx>

APPENDIX A — EXAMPLES OF RAT QUESTIONS

1. Which of the following is not an attribute of a thesis statement?
 - a. Take on a subject on which reasonable people could disagree.
 - b. Deal with a subject that can be adequately treated given the nature of the assignment.
 - c. Express one main idea.
 - d. Assert your conclusions about a subject.
 - e. Ask a question that you plan to answer about your subject.

2. What does the term peer-reviewed mean in connection with scholarly articles?
 - a. Authors in the field or members

of an editorial board have checked and approved the content of the article before it is accepted by a journal for publication.

- b. The journal editor has approved the content of the article once it is submitted.
- c. The author of the article has asked his peers at his or her institution to review and comment on it before he or she submits it to a journal.
- d. The article draft has been put up on a website so that peers around the world can give feedback before the article is written in its final form.
- e. Peer review doesn't pertain to scholarly articles.

3. Why is it important to be careful when using "not" in a search?

- a. "Not" is interpreted by some databases as a word to be searched, so "not" has to then show up in the items found
- b. You don't have to be careful when using "not." It really helps in all searches.
- c. Lots of databases don't recognize what to do with it, so it is better to never use it.
- d. It is possible that you will lose items of interest in your results.
- e. Because you don't know if it should be capitalized or not.

4. Which of the following is **not** a good strategy for finding scholarly material on the web?

- a. Search for content in digitized books
- b. Visit academic library websites
- c. Do a basic Google search

- d. Check out document repositories
 - e. Read the blogs of scholars interested in the field you are researching
5. Which of the following information source groupings contains only primary sources?
- a. Photos from your vacation, e-mail messages, and an interview
 - b. A biography, a letter, and a diary
 - c. An autobiography, the text of a speech, and a doctoral dissertation
 - d. A company's annual report, an article on CNN.com about the Civil War, and the movie *Avatar*
 - e. An X-ray, a monograph, and the novel *Sizzling Sixteen* by Janet Evanovich

APPENDIX B

The worksheet on the following page was developed by Judy Carey Nevin, Reference Services Coordinator, Courtright Memorial Library, Otterbein University, for use with a business course-related instruction session. This is an innovative use of a TBL-inspired multiple choice question that encourages student reflection, analysis, and engagement, working in groups. While TBL requires a longer course to be fully implemented, this is an example of how its methods can be used selectively in short instructional sessions.

**Given
this:**

A	B
Searching: Specific Databases , Show results from: "location analysis" in Title AND retail* in Description AND chain* in Description Basic Search Advanced Search Visual Search	Searching: Business Source Complete , Show results from: "location analysis" in Title AND "united states" in Description AND franchis* OR chain* in Description Basic Search Advanced Search Visual Search
C	D
Searching: Business Source Complete , Show results from: "location analysis" in Title AND "united states" in Description AND luggage in Description Basic Search Advanced Search Visual Search	Searching: Business Source Complete , Show results from: "location analysis" in Title AND "united states" in Description AND retail* in Description Basic Search Advanced Search Visual Search
E	
Searching: Business Source Complete , Show results from: "location analysis" Basic Search Advanced Search Visual Search Search History	

**Decide
this:**

Which search strategy produces results that are the best match for the assignment?

A few questions to consider:

1. Where in the results are your search terms appearing? What does that tell you?
2. Does the number of results relate to the quality of the results?
3. What is the age range of the articles in the results?