2012 Center for Instructional Technology
Team-Based Learning Course Design Fellows

collected wisdom on implementing TBL at Duke
participants listed on last page

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What can I do with my students on the first day of class to develop a positive response to TBL?

Dan Gauthier - Give a big picture of the class to generate excitement, then start to talk about TBL. Give examples of past experience (or experience of others) of the effectiveness of TBL and what things that students will be able to do at the end of the course that they would not be able to do in a traditional course. (Working more difficult problems, being more comfortable with the material, working as a team, etc.)

Richard Lucic - Explain the concept, provide justification for why this has value for them, and discuss how the coursework is enhanced by teamwork. Explain why it matters to them personally.

Michelle - Do a smaller version of IRA, GRA the first day.

Laura Lieber -- I explained how this is “cutting edge” in professional schools and also how reflective it is of “real life.” I also used the team-assignment task as a kind of “getting to know you” exercise, and encouraged them to come up with fun names for their teams. The students were all first years and bonded surprisingly quickly with their teammates.

Katie Kretovich- The students in our class are all premed and I think explaining how Duke is using TBL in their medical school classes (at the Duke and National University of Singapore) will be a big selling point for them. Also explaining that it is not traditional group work and will teach them good habits and they can learn more as a team.

Mine Cetinkaya-Rundel -- I teach a large introductory class (94 students) and I told the students that teams will, at a minimum, give them a core group of contacts in this class. The course moves at a fast pace, so it’s nice to have peers they can discuss the material with from day one, without having to wait for making friends in class. There is also a team project + presentation at the end of the course (this has always been a components of the course), so teams from day one help them get to know each other and learn team dynamics before they get to working on this project. They also work on computer labs in teams, and turn in one report as a team, and this sounds better to them than having to each write their own reports every week.

How can I form teams?

Laura Lieber -- I tried to find a statement that was relevant to the class but fun and interpersonally informative ("I'll try anything once!" is what I settled on) and had students rank themselves on a continuum and then we counted off. It worked very well, both in terms of forming teams of students with mixed attitudes towards the course topic (Food and Judaism) but also as an ice-breaker.

Alison Hill -- We based our teams on the score that students made on a pre-semester assessment. The teams were mixed according to their scores in an effort to make them as heterogeneous as possible. We did not take into account any other characteristics but we have a 300 person class.

Steve Kelly: Do a questionnaire before class begins that the students bring the first day. It asks for data you can use to insure diversity of experience and background.

CD Reid: Decide on a list of 4-5 diversity criteria that are relevant to the course and use these to line up the students starting with the first criteria. THese can include previous background in topics for the course, views on topics, etc. Then assign numbers to each students that will correspond to a group so each group has a representative for each criteria.

Richard Lucic: I plan to set the teams myself considering "diversity" of major, year, interests, and skill level. I usually have a great diversity of majors in my course, and I will attempt to reflect this diversity in the teams.

Katie Kretovich: I like the idea of lining students up based on a criteria and numbering off to form groups. However, I think it is still important to have the students fill out a survey and check the randomly made groups against the survey information to make sure you are happy with the distribution of students.

Daniel Gauthier - I gave a Sakai survey before the first day of the class. The problem is that there were students leaving or entering the course, so I would not try to form teams on the first day of class in the future.

Mine Cetinkaya-Rundel -- I gave them a pretest (30 multiple choice questions) that assesses their conceptual understanding of statistics. In addition, also gave a Sakai survey where they're asked previous math/stat/cs course they've taken, their (intended) major, and interests. I created teams such that students share major and/or interests and the average score for the teams are roughly equal. I also made sure that each team didn't have any more than 1 student who had taken AP stats and scored over 4. This approach seems to have worked so far, but team assignment was quite time consuming. If this is a model I'll be sticking with (looking like so), I might try to write an algorithm to do the first round of assignments, and then double check to make sure I agree.

Springer - I had them line up and count off based first on physics experience (AP, etc.) and then math experience. I did this the very first day, forming five teams of five people each; only

one person dropped the course so stability was maintained. As TBL lore suggested, the lining up process required them to discuss their experience with each other, which helped establish some cohesiveness.

Where do I find good materials to assign to students before class? Do I create the materials?

Dan Gauthier - I think it is important to create materials. I am using a text that is a bit dense. There are some online materials available, but students seem to really want to hear from me, not someone from another university/program. In the future, I will create short video clips like a mini lecture and works some example problems (using Bamboo/Camtasia) for the students to look at before each class.

Mine Cetinkaya-Rundel -- I initially started with providing links to existing YouTube and KhanAcademy videos, but I find that most of these teach mechanics and not concepts. So while I still will list some of those as “additional resources”, I’m also making my own videos. These are screencasts using Quicktime on my Mac, though I’m trying to migrate to recording them on an iPad since that’ll allow me to “write” on the screen. I agree that it’s important that the students hear it from the instructor. I also closely follow my own textbook, so the readings and the problem sets are assigned from there. It helps keeps things organized, which is especially important in an introductory course.

Springer -- for the video portion I used open source lectures from Yale and MIT intro physics courses.

Richard Lucic - I am using a combination of textbook, web resources, and self-created materials. I am recording some quick snippets of tips that I call Application TechNotes, similar to the Lynda.com videos. I do also use Lynda.com as a resource for this course. Many of the Lynda topics are very relevant.

How do I make sure students are learning the main take-away points? Do you write learning objectives or provide some other direction?

Steve Kelly: Provide a study guide. Do an actual slide with “takeaways” listed.

Dick MacPhail - we’ve made detailed “unit plans” with learning objectives, and/or a syllabus with learning objectives, which are then keyed to relevant text and/or on-line material. In a discussion with the students just before fall break it was clear that they are very much keying their studying to the learning objectives.

Laura Lieber -- I have had students reflect periodically on the learning objectives and course goals at specific points in the units, and I also put them on the weekly guide and assignments. I make a very conscious effort to keep them “present” and to make sure that students have them in mind when they are working on anything to do with the class. They seem to really appreciate

the focus and transparency.

Dan Gauthier - I create a reading guide (just written text) before each learning unit. It points out highlights, suggests example problems to work on, how the main points connect to overall course objectives, etc. In the future, would be nice if this was a video/written/spoken reading guide.

Yuvon - Effective learning objectives are one way to provide some direction about the important points. I think that it is also effective to provide the students with a guide or a very explicit syllabus that helps them determine which topics are the most important to master for the course.

Chantal Reid: I provide students with broad learning goals for each unit and with more specific learning goals for subcategories or specific exercises. For the reading assignments used to cover different concepts, I also provide a study guide to highlight what they should concentrate on and to help explain how the different concepts fit together. Basically it is an outline on what one would cover in a regular lecture.

Mine Cetinkaya-Rundel -- Yes, definitely! I split the course into 7 units (~ 2 weeks each) and each unit roughly corresponds to a chapter in the book. I post learning objectives with each unit (~10-20 items). The document also contains links to videos and “test yourself” questions that refer to a specific set of learning objectives.

Richard Lucic - As Dan mentioned above, I have created a “Reading Guide” for each unit of the course. These readings contain much of the background information for the labs the students will be assigned in the unit. Their performance on the lab and the unit RAT’s will give me a feel for the material’s value the sutdent’s comprehension.

How can I write good multiple choice questions for the readiness assessments? How difficult should they be?

Alison Hill: We have use RATs for our big gateway class over the last two academic years. We have gone from writing questions that are overly hard to questions that are very easy. The very easy variety seems to be much less frustrating for our students. These mostly consist of questions that focus on subheading titles in the textbook. Interestingly, in our mid-semester evaluation one student said that the RATs do not promote deep reading--they are too easy. At the same time we are not seeing the extreme frustration we have seen in previous semesters when the RATs were written at a significantly higher level.

Steve Kelly: This is extremely challenging. The questions need to be hard enough that students can see an improvement from individual to team scores. But if they are only hard because they ask for some obscure piece of data, they serve very little purpose except to test who has the best memory or read the material most closely. Questions that require fine distinctions in understanding key concepts are very hard to write.

Dick MacPhail - I think ours have tended to be a bit too easy, at least after the first couple of assessments. The teams still spend time discussing them, but it would be nice to ensure that there are at least one or two questions that are “tricky” enough to challenge the students and ensure meaningful discussion as teams.

Dan Gauthier - I first think about the application activities and I try to make sure the iRA/gRAs match the topics that will be in the AAs.

Mine Cetinkaya-Rundel -- I write the readiness assessments while writing the learning objectives so that each question speaks to one or few objectives. I try to write them so that it’s not very easy for individuals to score 100% but not that hard for teams to get 100%. Only one student mentioned in evaluations that they thought some questions were too hard for a readiness assessment (compared to “another TBL class where the questions are about the basics”).

Richard Lucic - I have attempted to make the questions include the key concepts that we will tackle during that unit. Of course there are many more important issues than can be addressed in the RAT, but hopefully a selectively chosen set will give an indication that the students making progress.

How do I write good, effective application activities?

Dick MacPhail: This is hard. Steve Craig seems to be good at coming up with applications that relate to a “real life” problem, and that integrate a variety of learning objective pieces, but sometimes they seem a bit “loose” and not as well defined as I expect to need next semester when I teach gen chem to a group with weaker chemistry backgrounds. A nice aspect of his questions is that they are more geared toward encouraging students to “think like chemists” and bring multiple concepts to bear in solving a problem, rather than compartmentalizing the various concepts.

Dan Gauthier - Agree with Dick that these are hard. I underestimated the preparation of the students and have had to come up with problems that are a bit easier. If the students cannot complete in time, I ask them to work in groups outside of class to finish off the problem as part of their homework.

Katie: This is really hard and one of the big differences between application activities and more traditional problem sets is that students need to learn the concepts while doing them instead of just practicing their skills. I think the best activities are ones which integrate multiple concepts and make the students work through them as if they were really scientists (for science classes). Another aspect which makes a good activity is one that makes students use a concept from earlier in the class and therefore reinforces their knowledge.

Mine Cetinkaya-Rundel -- I find these to be the hardest to write. I try to make them about the most challenging concepts in class. I also find it challenging to write application activities that don’t require the use of statistical software. I have been trying to avoid these since I didn’t want

to require students to work on computers in a lecture hall with no plugs, but I'm starting to think it'll be fine to require computers.

Nick Carnes: When I want to do an application where the students produce something more elaborate than a decision (when I break the "specific choice" guideline and ask the students to produce a video or a short essay), I invite an "academic celebrity guest judge" (usually one of the authors from the readings at the start of the unit) to determine which team produced the best final product. The students get a kick out of having their work evaluated by an outside expert--and they do better work because there are real stakes.

Richard Lucic - My course has always included application exercises (formerly I called these "Labs") in each class period. For my TBL conversion, I have reinvented some of these exercises to better reflect the spirit of TBL learning objectives, and also better organized the Exercises into my TBL units.

What do I do if teams complete the team quizzes or the application activities at different times?

Steve Kelly: This just happened in my class. I sat down with the team that finished early and started discussing some of the questions. This helped me understand what they had found difficult or obvious, which I could share with the rest of the class in my "clarifying lecture."

Alyssa: give the earlier finishers an assignment to research and report and related topic to their peers. Find ways to keep them on topic and engaged meaningfully in the class topic so they don't devolve into texting friends, doing course work for other class or talking about basketball.

Dan Gauthier - I have additional questions for the groups to consider if they finish in advance. These are not presented in the group call out and discussion, but I mention that doing these extra activities for the exam.

Mine Cetinkaya-Rundel -- I had this problem the other day, and was caught unprepared. Having additional questions ready seems like a good idea.

Springer -- I provide follow-up questions to those teams who finish early. Sometimes this is as simple as having them look at their result in a particular limit. Sometimes I'll ask them to solve the same problem using a different method (for example, something that is relatively easy to solve using conservation of energy can be very challenging if starting with Newton's laws.) For a recent problem involving dropped basketballs and baseballs, I just added a third ball (so then they had to work out the collision of first the basketball with the ground, then the basketball with the baseball, then the baseball with the third ball) and then I asked them to give the height gained in addition to final velocities. I was really worried that one or more teams would consistently finish earliest (or last), suggesting a mismatch in team creation. Fortunately that hasn't happened.

Richard Lucic - I plan to have additional add-on activities for those that finish ahead of the others.

How many units should I have?

Dan Gauthier - I am doing 8. This seems good.

Mine Cetinkaya-Rundel -- I have 7 units, so 7 readiness assessments. I thought more would be too overwhelming.

Dennis Clements - 6 or 7 units forecast. Each section needs to be 3 or 4 classes but we will see - this is for spring semester so I will have a revision then.

Springer -- I have many more than TBL suggests, about one per week in fact, but that is because intro physics is so hierarchical that it would be unreasonable to ask the students to, for example, study angular momentum in the same unit where they first encounter a vector. Maybe somebody can figure out a way to reorganize the course to make that possible.

Richard Lucic - I have settled on 7 units based on the technology subjects that we address in my course.

How can I do peer evaluation? How often?

Michelle- We used modified VALUE rubric and added two open ended questions. Students completed at midpoint and at final. Would be helpful in future to find some way to do this portion electronically- lots of time and paper cuts involved.

Rebecca: Creating a peer evaluation in Qualtrics is easy and will allow students to provide feedback on their team members easily and anonymously (mostly). We are doing peer evaluation twice but I've also asked about team dynamics on the midterm course evaluation. There are many models for peer evaluation out there. I combined a few but found the "text" answers to be the most useful (e.g., How does this team member contribute effectively to this team"). Likert-scale questions don't tend to provide much information, except to identify big problems.

Steve Kelly: I have done a first peer evaluation at midterm, and will do another at the end of the semester. It counts for 5% of the final grade. I used a five-point scale based on the team contract they have all negotiated.

Yuvon: Peer evaluation sheet or form via the class website (I would suggest an online form) where team members are able to submit an evaluation of their peers anonymously. I would suggest that peer evaluations are done once earlier in the semester and again later in the semester. The earlier one would help to address any major issues early that are keeping the groups from being as successful as possible. Additionally, I believe that the peer evaluations

are most useful when either there is no grade associated with them or when the students know that they will be assessed based off of not only the feedback they receive but also the feedback they give.

Dan Gauthier - 3 weeks, mid term, end of semester.

Katie: I would suggest an anonymous online form for students to submit feedback on their peers. It makes it easier for the instructor and the students feel more comfortable about being honest. Additionally, the students should give written feedback about their group to practice giving and receiving constructive feedback. In this case the students should be graded on the quality of their feedback and on what their peers say. Peer evaluations should take place 3-4 times throughout the semester (early, midterm, end of the semester and one more if it seems necessary)

Mine Cetinkaya-Rundel -- 3 times (week 6, 11, final, next time I'll do the first one a little earlier). They provide written feedback, and also distribute points among team members. I have found that students are hesitant to "take away points" from peers, even in situations where the written feedback identified problems, the points awarded were still high. Students peer evaluation score make up 5% of their final grade, and is a composite of what their peers award them, and an assessment of the feedback they give. The verbal feedback from the teammates are then distributed, anonymously, to the students. I edited some of the feedback that I thought could be re-phrased to be a little more constructive (instead of just negative). Peer evaluations were completed on Sakai. Distributing the comments to the students was a lot of work, and too much of a time commitment. I need to do things a little differently next time, which might mean written comments won't be distributed, but I think they're the most valuable part of the peer evaluations, so I would hate to give that up.

Richard Lucic - I plan to have the students do a midterm and final team evaluation. This peer evaluation will constitute 5% of the course grade. The basis of the evaluation will be a team contract that each team negotiates at the beginning of the course.

How do you make TBL work with a small class (e.g., 20 students)?

Laura Lieber -- My seminar has 18 students; we have two teams of four and two teams of five. At midterm, I reconfigured the groups because the students wanted to get to know the others in the class, but I plan to put them back into their original groups for the final unit of the class. It has worked fine.

Rebecca: Don't hesitate to offer opportunities for students to get to know each other across teams. Emphasize discussion between teams when doing team quizzes and application activities.

Alyssa: Using peer feedback is important for managing team dynamics. Use a variety of activities to keep students engaged and interested in learning. You can fall into a TBL rut

and lose student interest as the semester progresses just like you can in a lecture course. Fortunately, TBL structure is flexible, so you can use inter-team competition and varied reporting formats for application exercises to keep the students engaged.

Dan Gauthier - I have 9 students. Works fine. 3 groups of 3.

Dennis Clements - I have had 15-24 students over the last 3 years and I find groups of 4 works best - 3 is almost too intimate and 5 can be unwieldy (depends on the students obviously. But 4 has been a nice balance. Since it is a capstone class there is no attrition - sometimes switching to the other capstone class to fit a schedule better but once started I have never had to change the group configuration. Lucky I guess.

Richard Lucic - I have 20 students for spring term and will organize them into 4 teams of 5.

How do you make TBL work with a large class (e.g., 90 students)?

Michelle - space and room configuration was a challenge with 70 students in auditorium lecture room. Allowed them to take their application activities and work on them in spaces around the building and come back to report.

Alison: Break class into multiple rooms and solicit lots of TA help!

Mine Cetinkaya-Rundel -- Room configuration is a huge issue with ~100 students. It's hard to convince students that this is not a traditional lecture, when they're sitting in a traditional lecture hall. Clickers with self paced polling capability work well for individual readiness assessments since they don't need to rely on computers in a class with no plugs. While they're working on the team assessment, I'm able to review how they've done in the individual portion (e.g. what % missed which question) and tailor the feedback lecture accordingly. It would be great to get some additional resources so that more of us can walk around and help during the application activities.

What do you wish you had done or known to be more effective?

Michelle- allow students to participate in assigning percentages to get buy in, do peer feedback electronically, utilized my staff assistant more, develop grading rubrics at the same time develop the application activities, grade as many application activities as possible- the students didn't perform as well on those that they knew were not graded.

Dan Gauthier - Make videos for each class/learning unit. Don't try to rush too much at the beginning of the semester - they need to warm up to the process.

Mine Cetinkaya-Rundel -- Make more videos. I use screencasts, but would like to have one short (2-3 min) video of me per unit, highlighting the main concepts of the unit, somewhat like an introduction section in a book chapter. I also wish I had worked on developing learning

objectives for all units ahead of time. I'm finding that TBL requires more administrative/busy work than usual, so it would have been ideal to have as much of the infrastructure ready as possible at the beginning of the semester, so that staying on top of all these components doesn't get overwhelming.

Springer -- initially I was too rigid about getting the students to finish a challenge problem in a particular amount of time. Now if there is not enough time before the end of class to finish a problem I either carry it over to the next class meeting, or instead of starting a new one I do a demonstration that I then turn into a subsequent challenge problem or problem set problem for them to turn in. But I still struggle with how to provide an optimal amount of time.

Participants

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