Using Technology to Support Team-Based Learning

Adopting Team-Based Learning

Even for experienced teachers, adopting a new teaching strategy is a creative process that takes time and effort. It is a little like finding new clothes. Of course before you look for new clothes you must first decide if you need them and what you need them for, a formal dinner or a trip to the gym. The need prompts you to begin a search for the new clothing. Now that you know your need you try on different items until you find one that fits. Finally you wear the item and make it yours by adapting it to your needs. For me, team-based learning become the garment I needed and the one that I have made fit.

The Need for A New Strategy.

As a middle grades teacher for half of my teaching career, I knew and used many active and collaborative teaching strategies with K-12 students. When I began teaching future teachers, I wanted them to see the possibility for student learning that these strategies provided. I learned that for future teachers to adopt a new teaching strategy they must not only read about it but they must experience it as a student. They must see best practices in action if they are going to be able to move beyond the teaching methods that they have experienced in their own K-12 education. What I needed was a collaborative strategy that worked as well for them as my collaborative teaching strategies had worked with K-12 students. I needed a strategy, a new garment if you will, that fit this situation. Team-based learning became a way to focus my use of collaborative strategies for my adult students. While very effective and well-researched cooperative learning strategies (Johnson, Johnson, & Holubec, 1991) worked well for me with K-12 students, I had a hard time adapting them to college students. In the K-12 classroom I saw my students every day
and the majority of learning took place during class time. With college students, a greater amount of learning takes place outside of class. Even though I tried to implement cooperative learning in ways to ensure that the key elements of positive interdependence and individual accountability were present, it was much harder to tell how successful my attempts were. The procedures of team-based learning provided a way to ensure that these key elements of cooperative learning were present.

I found that for many of my students breaking away from the common methods of lecture and recitation was not easy. The students who want to be teachers tend to be very successful students and learn effectively with lecture and recitation methods. It was not easy to convince them that collaborative strategies were effective because of the many negative experiences they have had with group work and their success in working individually. The team-based learning strategy was the first strategy that I had read about that was designed explicitly for adult learners. I saw in team-based learning the potential to provide my students a researched-based strategy that could convince my students of the power of social learning.

**Getting A Good Fit.**

Now that I had found something that I felt met my need I had to make sure it fit. When a teacher considers a new strategy he or she must examine his or her beliefs about teaching and make sure that that the selected strategy fits those beliefs. When I began to use cooperative learning strategies as a K-12 teacher, I knew that implementing collaborative strategies was not easy, but also that the rewards were great. I knew how much more I had enjoyed teaching as I came to master cooperative learning strategies. I saw in team-based learning the potential to have that same excitement and enjoyment again working with pre-service teachers. Exploring this
strategy has provided me the opportunity to think critically about teaching again, for you must think critically if you want your students to think critically.

In addition to checking the fit of the strategy to beliefs about teaching the teacher must check the fit of the strategy to the content. The main focus of the team-based learning strategy is application of content. For education this is an easy fit because education is an applied discipline. Students in education courses regularly evaluate educational resources, write and teach lessons to students using a variety of strategies, and learn methods for managing students and communicating with parents.

Making the Garment Your Own.

I began the process of adopting team-based learning by selecting a single course. I selected the course that is from my area of speciality within my discipline, educational technology. I teach this course every semester with multiple graduate and undergraduate sections. A challenging feature of this course is that it is required of all students seeking teacher licensure, so the course has a mixture of majors from elementary education to music, art, and physical education students, to secondary students in many disciplines. Unlike many of the examples of team-based learning that I read about, my educational technology course is smaller with only about 24 students in each section. The course is also taught in a computer lab, which limits the possibility of moving furniture.

I found that to get the full power of team-based learning requires that you adopt all key elements for the whole course. It is not as effective if only parts are used or it is used in only part of the course. The whole course must be designed with this strategy in mind. I used the significant learning course design strategy (Fink 2003) to totally redesign this course. I found his taxonomy of significant learning very helpful in really thinking about what I wanted to achieve
in this course and ways that I could make learning significant for my students. I think that using the course design method described by Fink was crucial in helping me clarify the goals that I wanted to achieve in the course. Having clear goals makes the implementation of team-based learning more successful in a shorter period of time. Another reason, that I selected my educational technology course as a beginning place is my belief about the role of technology in teaching. I see great potential in use of technology as a tool for creating, communicating, and collaborating. Technology became a way for me to more effectively adapt the team-based learning strategy to my course. It also provided a model of best practice for my students that again is crucial in education courses.

In the following sections, I will share the ways that I have made team-based learning my own strategy through the use of technology. While you may not teach in a lab, the technology use I describe can easily be adapted to any classroom where one student in each group has some type of web-enabled device, either a laptop, a net book, or an iPad. In the examples that follow, either a single computer per team was used or students completed part of the work outside of class on their own computer. I will organize these ideas by the four practical pieces that comprise the framework of team-based learning: strategically formed, permanent teams, readiness assurance, application exercises, and peer evaluation.

**Strategically Formed, Permanent Teams**

**Introducing TBL.**

The first semester I used team-base learning I didn’t have as much success as I had wanted. At the end of the semester I surveyed the class about their feelings about team-based learning. I learned from the surveys that the students didn’t see working with a team as powerful
or valuable. While some students reported that team-based learning was better than other collaborative experiences, some reported little or no difference. The first time I used team-based learning I formed teams the same way that I had in the past with cooperative learning groups. I had students fill out information cards with information about their licensure area and self-assessed technology skills. I didn't tell the students why I was asking for the information on the cards that each student completed. I used the information on the cards to attempt to form heterogeneous teams outside of class. I only offered a little information about why students would be working in teams and my method for creating teams when I announced the teams in class the next class period.

After my first semester using team-based learning, I realized that I needed a better way not only to form teams but also to get my students to see the value of and buy into team-based learning. I decided it was important to begin the class differently than the regular introductions and syllabus overview. I now begin the course with a team activity similar to the type of application problems that they will be doing later. For this activity I form teams of four based on where the students are seated. I then show two YouTube videos that provide different viewpoints about the use of technology in teaching. After the students watch the videos I have them discuss in their teams, which one they thought best describes the role of technology and to give three reasons why they selected the video they did. I have response cards with the numbers one and two for each team. Then I ask the teams to simultaneously display their cards. This is followed by a class discussion. While this is the first day and the discussion is not that easy to get going, it still provides a picture to the student of what class will be like. Students get the feel of team-based learning on the first day of class. I also shared my own personal rationale for deciding to use team-based learning. From surveys I did at the end of the second semester I found that more
students saw the value of team-based learning. So now sharing my own personal rationale, which includes the value of team work for 21st century learners, I see as crucial to getting students to buy into the team-based learning strategy.

**Forming Teams.**

After the team activity we discuss what makes a good team, using a sports team analogy - a football team with only quarterbacks would surely lose. I explain that I want to form teams with a diversity of learning styles and perspectives. I ask students to consider if good friends make good teammates, and we discuss the advantages and disadvantages of close friends on teams. I lead the students to see that sometimes good friends in the same team can split the team into sub groups. This discussion is followed by the first assignment in which the students are directed to study the syllabus for a test and go online and take the VARK (Fleming, 1992) styles survey outside of class. This survey can be taken in under 10 minutes. It provides a score that identifies the learner as visual, auditory, read-write, kinaesthetic, or multi-modal. I emphasize that this is the student’s first opportunity to make a good impression to me and to the other students of he kind of team member they will be. They are to bring a printed copy of the results of this survey to class on the next class period. On the second day of class I have students write on the top of the survey anyone that they are good friends with and their licensure area. I then take the forms up beginning with students who are multi-modal. I want to create four teams of six, so I place these into four teams. I continue through the process taking up each different learning style and placing students in teams based on their learning style and their licensure area. While I am creating the teams in class, the students are working in informal teams to review the syllabus and come up with a list of questions that they would like to ask. By the end of the period
the teams have been formed. I have students introduce each other and continue their discussion of the syllabus with their newly formed team.

I am convinced that there is no perfect way to form teams when you don’t really know your students. I have found using the VARK survey to be helpful in that students see the team forming process as transparent. They have reported on several surveys that I have done at the end of the semester that they like this way of forming teams. There are still teams that don't gel, but those have been far fewer since I started using this method.

**Readiness Assurance**

Now the real work of team bonding begins. It will happen slowly. The next assignment is to prepare for a test over the course syllabus. I use this to introduce the readiness assurance procedures. This test is only for practice and it lets the students experience the readiness assurance process without worrying about a grade. After the test we review the results and so far every singe time I have done this the team score is always higher. This has served to increase students’ positive feelings about working on a team.

**Developing the Readiness Assurance Test.**

The heart of the readiness assurance process for the teacher is preparing the test and determining a process for giving feedback. The more immediate the feedback is, the better. One method to achieve immediate feedback is the use of IF-AT forms with multiple-choice tests (see Introduction for a description). My first difficulty with preparing readiness assurance iRATs was with multiple-choice questions. While I understood the importance of making iRATs that were objective and could be taken in 10 minutes of class time, I found it hard to develop only multiple choice questions that I felt really tested the course content. IF-AT forms aren't easily adapted to
other objective question types such as fill in the blank or listing that I was more comfortable in creating. I liked to use matching for definitions of terms rather than multiple choice. I also felt more confident that students really know the material when they can list the key elements of something or write the proper term in a fill in the blank question. This made the IF-At forms not work for me.

**Providing Immediate Feedback.**

My first method of adapting iRATs was to create tests with some multiple-choice, matching, short answer, and listing without using IF-AT forms. Students would take these individually and then as a team following the readiness assurance procedures. I wanted to find a way to ensure immediate feedback that IF-AT forms provide. Since my classes are relatively small with only four teams, I would grade the iRATs in class as each team finished. Teams could then review their answers and determine if they wanted to appeal any questions. This worked adequately but I still wanted something more immediate. Something that would let them know how they were doing during the tRAT and have more impact then just waiting for me to return a graded paper. I considered using the testing features of the course management system but found this complicated and clunky. In addition many students have reported their dislike of taking tests online. Robinson and Walker (2008) describe a team-based learning, technology-based, testing system they have developed. I decided on something much simpler, a PowerPoint presentation. The first time I tried the method I was so surprised by the reactions I began to hear. There were claps and high fives for right answers. I also heard much better discussion and much more critical thinking after each question. Following is my process for creating and implementing this procedure to give immediate feedback.
1. I created a iRAT answer PowerPoint template presentation. I used this template for each module so that made creating the presentation easier. For each question there were three slides.
   a. Slide one - copy of the question
   b. Slide two - a warning slide that asks students to make sure that the team answer was marked and that they all agreed. I learned I needed to add this slide the first time I tried it when one team accidently advanced to the answer slide before they had finished discussing the question.
   c. Slide three - the answer to the question. It is important to make the text on this slide a different color text from the original question slide. I usually use a bright color for this text. This way as I monitor the teams, it is easy to ensure that the team is not writing the answer to a question that is on the screen. If I see a slide with colored text and they are writing an answer I know immediately that they are cheating.

2. After creating the PowerPoint presentation I save the file in two ways, as a regular PowerPoint presentation and as a PowerPoint show (see the help features of the software for instructions on how to do this.) When a user clicks on the file saved as a PowerPoint show it opens up the file in full-screen presentation mode so that the user doesn't see all the slides laid out in a sidebar and can not make changes to the presentation.

3. Each team has a team folder and a team flash drive for use during class. I copied the presentations to each flash drive. I found this to be much easier than trying to e-mail or post the presentation to the course management system.
4. I gave the readiness assurance test in class to students individually as described in the readiness assurance process. When teams were ready for the team test they put up their writing instruments, got a blank copy of the test and a writing instrument of an unusual color from me, and opened up the team flash drive on a single computer.

5. The team then recorded their answer on the team test and then checked for the correct answer on the presentation. They mark the answer as correct or incorrect but I also go back and check their work after class and assign points.

This method was very successful and well liked by the students. It allowed me the freedom to use matching, fill in the blank, true/false, and listing in addition to multiple-choice questions. It also provided immediate feedback to students for each question in the same way that the IF-AT forms do. Creating the presentations for each RAP was simply a matter of copying and pasting the questions from my word processing document to the presentation template and then copying the presentations to the team flash drive. It also freed me up to move around the room and listen to conversations that students were having during the team test. I knew sometimes where the major misunderstandings were even before I graded the individual tests. Of course this method, like any testing situation, has opportunities for cheating. Diligence in monitoring each team and making sure that the powerpoint slide matches where they are on the test is crucial.

The next class period after the test I returned the graded iRATs to the team folder. As soon as class begin, actually as soon as one person from the team was in the classroom, the students recorded the grades in a spreadsheet that was stored on the team flash drive. This spreadsheet automatically calculated the average of the individual scores. I had a place on the whiteboard for each team to record the score on the team test as well as the average of the individual scores. I award bonus points to the teams with the highest team score and to the teams with the highest
average of individual scores. I found this little extra competition as a way to motivate teams to develop a team spirit and desire to help each other do well.

**Helping Students Prepare for the RAT.**

Another way in which technology supported the readiness assurance procedure is in helping students prepare for the test. The majority of students who take my course are freshmen or sophomores. They have become so dependent on someone telling them what is important that reading even one chapter and selecting the important ideas is for many a new skill. In order to help them end their dependence on a teacher created study guide, I implemented the "studycast" procedure developed by Robinson and Walker (2008). In this procedure each team member prepares a four-slide PowerPoint presentation with each slide containing one of the four ideas that he or she thought were the most important of the reading. Students must send the presentation to their team members by 5:00 on the day previous to class via e-mail. Each team member then must read over the important ideas selected by their team members. Each team member who participates by sending his presentation to the team receives bonus points on the individual test. In class each team is given 10 minutes to put together a team PowerPoint based on the slides submitted by each member. There is no limit to the number of slides this presentation can contain. Then each team makes its presentation to the class with each team member taking a speaking part. After class the teams send the team PowerPoint to all members of the class. The readiness assurance test follows in the next class period. While this method helped it also required a lot of class time. After the first study cast and readiness assurance test I give each team the opportunity to develop a way to help each other prepare for the test using technology in some way outside of class. Some teams made study guides in the form of powerpoint presentations and posted them on the class learning management system, i.e.
Blackboard. Some teams worked out ways to outline the text and post the outlines on the team wikis (the team wikis will be described later). When I approve the method then each team member that participates receives bonus points on the individual iRAT and teams where everyone participates receives bonus points on the team test.

**Application Activities**

**FRAMEWORK GRAPHIC HERE**

**The Importance of 4S Problems.**

I think for any new user of team-based learning, creating effective application problems is the most difficult part of the process. Since I had used cooperative projects in the past, my first attempt was to just use the projects I had already created as they were. This failed miserably. The activities I had used in the past were really complex team projects with individual parts done outside of class. They tended to have students create a product of some kind. These types of projects were not transforming the groups into powerful learning teams. Students were simply splitting up the parts of the project and each person doing his or her own part. There really wasn't any discussion of the projects between teams to help build a class community. I went back to the team-based learning literature and realized that I was not creating application problems that followed the 4S model for application problems: significant problem, same problem, specific choice, and simultaneous reporting. I found that the activities that I was using were significant problems and the same problem, but they did not require a specific choice and there was no simultaneous reporting of the results between the teams. I looked for a way that technology could be used as a tool to improve these two aspects that were lacking in my application activities. The technology that I found was learner response systems and wikis.
I began transforming my application problems by requiring them to have a specific choice. For me the thing that made developing specific choice problems difficult was that I assumed that specific choice meant right answer. In educational technology, unlike other disciplines that have problems with right answers, there is no one right way to use technology to support learning. So I found it difficult to develop problems that had only one right answer. To create problems with a specific choice I decided to have students evaluate things or rate things based on the presence of certain elements. This idea of having students evaluate things rather than come up with a right answer seems so simple now but when I first discovered this idea it became a great break through. It made application problems that fit my content much easier to develop. I now had a kind of template or structure that I could vary and use in different ways.

**Using Technology to Support Team Application Problems.**

**Using learn response system.**

In the first team application problem that I developed using this strategy we watched as a class a short video of a teacher using technology. Each team then completed a ratings sheet handout where they had to rate the use of technology with a score of one to five for each of several elements that had been described in the text. Each team recorded its ranking on a handout and provided a rationale supporting their choice. After all the rankings were completed I had each team report their ranking for each element by holding up a card with the number ranking. While this was much better then before, there were still a few problems. Teams finished at different times and their reasoning was inconsistent with some teams having very good discussions with lots of critical thinking and some with very little. The next semester when I used this problem I introduced the use of learner response systems, LRS, or clickers. We watched the same videos as before only this time I put up one element on the interactive
whiteboard and gave the team a limited amount of time to come to a decision on the rating. The clicker system I use can display a timer on the interactive whiteboard. There is something about knowing the amount of time that one has that keeps discussions more on track, thereby increasing the amount of critical thought. Each team had a single LRS device. On signal the teams entered their responses. We could see the average rankings and team responses immediately and then I randomly selected one student from each team to share the rationale for their choice. I repeated the process with the next element for the teams to rank. As we went through the elements the quality and quantity of the between team discussions improved. We repeated the process for another video. After watching both videos and completing the ranking exercises with the LRS I had each team select the video that they thought was the best example of the use of technology. This time they recorded the rationale for their ranking on a handout as well as the class discussion. This provided me with a product to use for grading.

**Using wikis.**

After creating one application problem that now had all four of the elements of good application problems I wanted to develop more sophisticated ways for teams to simultaneously report more than just a single one word response, such as an agree or disagree card or a rank of an item by holding up a number card. Technology again provided a tool for improving application problems through the use of wikis. Wikis became more than just a way for simultaneously reporting for application problems. They became a tool for real collaboration for other parts of the course. They became a place for students to share their individual work for peer review.
What is a wiki.

A wiki is an open source, Web 2.0 tool that allows multiple users to easily create web pages and post discussions about those web pages. It is a way for allowing anyone who knows how to use a text editor to create a website. Users can put text, images, files, and media on a page as easily as they can in a word processing file. Each wiki can have multiple pages and viewers can move between pages using a navigation bar and links added to the text on the page. While a user can change the physical appearance of a wiki by adding colors and images most wikis have these common features which appear as tabs on each page:

- Page (or Read): This tab shows the text on the page. In some wikis this tab allows the user to print, backup, or add tags to a page.
- Discussion: This tab will bring up a box similar to an e-mail. The user puts a title to the post and then writes a message in the discussion box. Users can then reply to the post and create a threaded discussion.
- History: This tab show who edited the page and when it was edited. The viewer can click on a item in the history and see by means of different colored text how the page has been changed.
- Edit: This tab brings up a simple editor and allows the user to edit the page. A wiki owner can limit who can edit the page or leave it open for anyone to edit.

The largest wiki is of course Wikipedia, but there are more wikis than just Wikipedia. There are several wiki servers that allow users to set up an account and create wikis for free; wikispaces, wet paint, pbwiki, and Google sites are the most popular. In addition since wiki software is open source, several universities have set up their own wiki servers for use by their own students but viewable by anyone with Internet access. In this course I used wikispaces.
While I do teach this course in a computer lab, wikis can also be used in any classroom that has a wireless connection. Only one member per team needs to bring a laptop to class. I find that at least a fourth of my students still bring their laptop to my class even though we have class in a computer lab.

*Getting started with wikis.*

The hardest part of using wikis is setting them up. Wikis are relatively easy to learn to use. Most wiki servers provide good help pages and video tutorials. Introducing wikis will take about a class period. Explaining how to use a wiki is beyond the scope of this chapter; however, each of the wiki servers I have explored have excellent help features and one can learn to use a wiki easily. I taught myself how to use wikis from the help tutorials that were provided. Following are the steps I use to introduce wikis.

1. Before class I create a wiki for the course. I prepare an introduction to the course on the home page of the wiki. I also make a page that I call "Teams." From this page I will link to each section of my course and each team and individual wiki. At this point I create the page with just team names. The links must be added later after each individual and team has created their wikis. I also add a resource page with links to interesting web resources that I use in class and that students find. I put a link to the course wiki in the course management system.

2. In class I explain what a wiki is and show them the course wiki. Now that I have used wikis for several semesters I have examples of course wikis from the past that I can also use. It is important to make sure that students understand that anyone can see what is posted on a wiki. I ask them to only use their first name and to provide only limited personal information.
3. I review basic terminology making sure they know that they must create an account, which requires a username and password, and also a wiki. I explain that the permissions for the wiki need to be set so that only members can edit pages but that anyone can post a discussion. I have found it is helpful to have students complete a simple checklist sheet on which they write their username, password, the wikispace name, and URL that is created from that wikispace name. It is important that students do this before they create the wikis. I combine this checklist with an instruction sheet that walks students through the process with screen shots of the wikispace page showing correct permission settings.

4. I assign each student to create an account and wikispace outside of class. I provide some requirements for what to include on the home page. They must also make a second page with their individual goal for the course. This is something that I have students do to help them become self-directed learners. Throughout the semester they must demonstrate what actions they have taken toward meeting their individual goal and put that information on their individual wiki.

5. The following class session after each student has created his or her own individual wiki, one team member is selected to create a wiki for the team. Each user account can have multiple wikis. Each team wiki has link to each team member's wiki and the course wiki. Once the wikis are created each team can easily create a new page in the wiki for each team application problem. Throughout the semester each team and individual continues to build on the wiki. It is important to make sure students make backups of their wiki. One assignment is that they turn in a copy of the backup of their wiki to me through the course management system. After the team wiki has been created then each team creates a page for each team application problem. Each application problem uses the wiki in a different way.
Examples of application problems using wikis.

Using wikis have provided many advantages and made it possible to extend the team application problems outside of class. For example in one application problem each individual team member is given a specific resource to evaluate before class. They must post their evaluation on their individual wiki before class. During class each individual shares his or her review of the assigned resource. The team then selects the best one of these for a specific teaching situation (specific choice and simultaneous reporting thus being accomplished). On the team wiki they post a link to the selected resource and give two reasons they selected this resource as the best. After all selections have been posted we have an in class online discussion. Each team must review the wikis of the other teams in the class. If they selected the same resource as best they post a discussion on the other team's wiki congratulating them on making the best choice and providing another reason why the selected resource is the best. If they selected a different resource they try to persuade the other team that the resource they selected was a better resource. Teams can all speak at once in a way. In a class discussion each team must take turns sharing why they have reached the decision, with wikis even this can happen simultaneously. Students today are much more comfortable communicating this way since it is more like Facebook and texting methods they use daily.

There is value in both face-to-face and online discussions. As we progress throughout the semester both types of discussions improve in the amount of critical thinking and involvement. In another application problem, I have used the wikis to extend the application problem outside of class. After our application problem using the 4S method is completed in class, I require each student to go back and post a discussion describing how their thinking has changed and what they have learned. I then require them to reply to another team member's reflection post.
Benefits of using wikis.

By using the team wikis in these various ways I have been able to gradually increase the complexity of the team application problems throughout the semester. This has also allowed me to have students participate in collaborative projects in addition to just the application problems with a single specific choice. Teams no longer have to find a time and place where they can all meet to work on a collaborative project. Since the editing of each page is tracked in the history tab and visible to any viewer, it is easier to tell what part each team member played in the creation of the project. It builds in accountability to team projects that was missing in other collaborative projects I had done in the past.

An example of this type of collaborative project that is made possible by the skills learned in the team application projects happens after the final module of the course. The teams participate in a mock grant competition that requires them to use all the information that we have explored during the semester. They take the roles of a team of teachers at a single school of their choice and they prepare a grant proposal in the form of a presentation. As a part of the proposal they develop a set of learning goals for their school and describe how they would use the grant money to purchase technology to meet those goals. Teams are graded on their technology selections and their presentation. To make the experience more realistic in addition to the grade I ask other faculty members to serve as judges and the teams are awarded a finite number of bonus points based on the quality of the presentations. This assignment has been very successful. By this time of the semester the teams have really learned to work together well through the use of the readiness assurance process and application problems. They have the necessary skills to really work collaboratively. The quality of work on these team collaborative projects is much better then before I used team-based learning. Students no longer just do their part of the project and
piece it together at the last minute the way they did before I used team-based learning. The projects show much more integration of ideas from different members and are much more creative.

The wikis have also been valuable collaboration tools in other ways. Most teams use the wikis as a way to help each other prepare for the readiness assurance test by study guides that they have created. After each team application problem I give an individual application problem of some type. Students post some of these individual assignments on their individual wikis. Individual team members then review the work of another team member and suggest improvements before the final individual project is due. Several students have reported that they have used the resources and ideas from their own wikis and the wikis of other students in class in developing lessons they actually teach in practicum and student teaching placements. The students develop a sense of pride in their wikis and share them with other students and cooperating teachers that they work with in the public schools.

**Peer Evaluation**

Using Wikis To Aid Team and Peer Evaluation.

Wikis also play a role in peer evaluation. At two times during the semester I have teams evaluate their ability to work together. The first time this occurs is about a third of the way through the semester after the first 2 modules have been completed. Each team creates a page on the team wiki in which they do two things. One is to make a list of the qualities of a good team member. I use these qualities to develop the peer evaluations for the class. Another thing that the team does is to describe one thing that they do well as a team and one thing on which they need to make improvements. They develop a team improvement goal. About two thirds of the way
through the semester the teams review their progress toward meeting the goal and determine another area of improvement or things they still need to do to reach their first goal.

**Using Other Technology to Aid Peer Evaluation.**

Technology is also used in the individual peer evaluations. About midway through the semester, I share with the class the individual peer evaluation instrument that I have created based on the qualities of a good team member posted on the team wikis. Since these qualities tend to remain the same semester after semester I usually can use the same peer evaluation form each semester only making minor changes. In class the students are given a chance to make any suggestions or changes to the instrument. The evaluation instrument has a place for a rating and a place for comments. I prepare a word processing document with five copies of the evaluation instrument, one for each team member. I send this to each student via e-mail. The students complete these outside of class and bring a printed copy to class. I take the copies and sort them by individual and then give the collection to each student. I do this quickly in class usually while students are taking an iRAT and I do not look at the comments. Students are required to turn in the printed copies as part of an assignment so I only check to make sure that comments have been made and award points for completing the evaluations. At the end of the semester we convert this evaluation instrument to one with points. The class decides within a range that I set how many points the peer evaluation will count. As a part of the course final each student completes this peer evaluation and I average the scores given to each individual by their team members to count as part of the grade for the course.
Conclusion

These examples represent the ways that I have adapted team-based learning to fit my students, my own teaching style, and the content. While the process of adopting a new teaching style is not always easy and can be time intensive at first, I have found it extremely enjoyable. The key things that have made it more effective are the use of the immediate feedback for each question during the readiness assurance tests and the use of the 4S model in developing the application problem, especially the specific choice and simultaneous reporting elements. Using technology has helped me accomplish this. As I continue to grow in my use of team-based learning I will continue to search for ways to use technology, especially the many Web 2.0 tools, as a way to model the use of collaborative learning for my students.

Using team-based learning has provided my students the opportunity to have positive and powerful experiences working in teams. Students have not only grown in content but they have grown in their ability to collaborate. In the final project they talk about ways they can use the wikis in their future teaching. The ability to actually develop a vision for technology use and apply what they have learned about technology is so much more important to their future teaching than in the past when they only learned how to use specific software tools, how to do effective web searches and how to evaluate web resources. They now really see ways that technology can be used in teaching beyond a PowerPoint lecture. They see more authentic ways for their students to use technology. They have a developed a vision for how technology can be used beyond rewards for finishing work early or typing papers. For me, this should be the outcome of any educational technology course, the ability to grasp a vision for how teachers can use technology to support the learning of all students. I believe that team-based learning has made this outcome a reality.
References


