A Compact Introduction to

Team-Based Learning

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Larry Michaelsen developed the prototype for what was originally called "Team Learning" as early as the 1970's at the University of Oklahoma in the School of Business. The instructional model was an effort to ensure the benefits of small class learning in the face of rapidly expanding class size. Bill Roberson, after years of experimentation with "group work" on his own, discovered Team-Based Learning in the 1990's through Michaelsen's publications and workshops. He found in them the means to create the group learning dynamic that makes possible a true "critical thinking classroom."

This article is an integration and distillation of the many descriptions of Team-Based Learning that have appeared over approximately 30 years, with additional suggestions and guidance for implementation of the method.

Welcome to Team-Based Learning

Various paths lead university and other post-secondary instructors to Team-Based Learning, but we all have in common two key motivators: 1) the desire to create deep, engaging learning experiences and 2) the desire to make our classrooms places of energy, inclusion and enjoyment in learning, for our students as well as for ourselves. Team-Based Learning is a teaching strategy for creating classrooms that foster enthusiasm for learning through increased student ownership of learning, independence and self-sufficiency.

Being a specialized example of what is typically called a "flipped classroom" approach, TBL is an ***activity-intensive*** and ***student-centered*** strategy, which significantly alters the instructor's role from that of "presenter" of information to "designer" and "facilitator" of engaging classroom assignments.

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(For this reason, instructors who find their greatest satisfaction in the performative dimensions of teaching, such as by lecturing, making presentations and conducting demonstrations, etc., may find the TBL approach a less-than-perfect fit. TBL asks instructors to be comfortable with a classroom where students are given latitude to think for themselves, and where student voices are regularly at the centre—within a framework constructed by the instructor.)

This short orientation to TBL is a description of the perspectives, tools and practices you'll need for a successful first-time implementation of the TBL model in your course. For more in-depth information we recommend several additional publications that provide more fully developed explanations and examples:

- Michaelsen, Knight, and Fink (2004, Stylus), *Team-Based Learning: A transformative use of small groups in college teaching*

- Michaelsen, Parmelee, McMahon and Levine (2008, Stylus), *Team-Based Learning for Health Professions Education*

- Roberson and Franchini (2014). Effective task design for the TBL classroom. *Journal on Excellence in College Teaching, 25(3&4).*

- Sibley, Ostafichuk, Roberson and Franchini (2014, Stylus), *Getting Started with Team-Based Learning.*

- Sweet and Michaelsen, eds. (2012, Stylus), *Team-Based Learning in the Social Sciences and Humanities*

Additional resources can be found on Jim Sibley's UBC website at http://learntbl.ca/what-is-tbl/.

What does a TBL classroom look like?

Here's a class meeting around mid-term of a course on Physical Therapy that we recently watched in action. We caught Sylvia Mitchell on day two of a 3-day learning module. In the preceding class students had participated in a 4-step Readiness Assurance Process unique to the TBL model *(this process will be explained later in this essay).*

The Readiness Assurance Process had already ensured that nearly every student developed preliminary understanding of the content being covered and applied in this part of the course, and that student teams had continued to gel. Now, on day two of the module, the deeper learning about that content, through team assignments and all-class discussion, was about to begin.

> *Sylvia Mitchell enters her classroom on Thursday, just before 9AM. She is pleased to see that all but one of her 30 students have already arrived and are chatting amongst themselves in their permanent teams (there are 5 teams of 6 students each). She cheerfully makes small talk with students for a few moments, then starts the class meeting.*
>
> *"This past Tuesday you completed the Readiness Assessment Test on the basic ideas behind the challenge of moving from client assessment and diagnosis to creating, choosing and*

recommending treatment plans. Today we're going to look more closely at how those ideas work in reality.

"Please read the one-page patient data sheet in your folders. Your job is to analyze the situation and condition of this patient, and make a determination about how you would respond with treatment, and why."

Students read quietly for about 2 minutes. After students show signs of finishing, she places a slide on the screen and says,

"Here are 4 potential treatment plans. In your teams I'd like for you to compare and rank them, from most justifiable to least justifiable in this case, given the client data. Be ready to say WHY, based on your reading from this past week. Feel free to refer back to your textbooks or other materials if you need further clarification of any of the concepts. Write down your team's ranking of these plans on a piece of paper. You have 20 minutes. Go."

Suddenly the room is loud with a number of voices talking at once. The body language of students communicates engagement, as students lean into their circles and point to the course materials as they discuss. Sylvia wanders about the room listening to the team conversations, but not saying anything to the students. As the 20 minutes come to a close, she glances at the sheets where students are beginning to indicate their ranking of the 4 plans.

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Most of the 5 teams are close to finished. All of them have identified at least a highest and lowest choice. To the whole room she now says,

*"OK, stop. Please take the blank card from your folder and write down the letter of the treatment plan your team selected as **most justifiable**." The teams take a minute to finalize their decision and write down the letter corresponding to their choice. "On the count of 3, please hold up your team's response. One, Two, Three...Show!" 5 cards go up all at once. 3 of them show the same answer, "Treatment Plan B." One team answers "C:" and another team answers "D."*

Sylvia pauses and, with her students, takes in the range of responses. Because of the reporting format, in a glance she can picture the various paths of thinking her students have traveled. With all team responses visible to her, she can now decide how best to proceed in the all-class discussion, so as to explore with students all of the issues she has targeted.

On this day Sylvia decides to start with the responses that everyone rejected. She begins the debriefing process by saying, "Interesting spread. Nobody chose A. There seems to be some consensus on that. Mary, what's the reason your team did not put A on the top of your list?

Mary gives an explanation for how treatment plan A ignored a dimension of the case that, according to their readings, was critical. Sylvia invites another team to comment ("Did you think the same thing?"), then moves to discussion of the other options: "Let's hear from the team that said "C." Why did you conclude that this is a condition that should be treated chemically...?" And so it goes for 20 more minutes, as Silvia asks the teams to respond to each other's reasoning. Through the exchange, Sylvia questions (Why? What's your rationale and evidence for that? How is that consistent with what you read in the textbook? How would you respond to that other team's argument?) and lets students argue for their analysis and evaluation of the various plans.

Sylvia facilitates so that students talk to each other, and challenge each other's interpretations of key concepts or contradictions in reasoning. She is careful not to divulge her own thinking during this exchange.

More than 20 minutes pass in lively analysis and debate, and Sylvia now moves toward closure. "I'd like to draw your attention to several important things you said. First of all, kudos to the groups who picked up on the implications of the blood test data. That led you to Plan B, and you made a good case for it. Several of you focused on the client's present physical condition. That's important to consider, but I'd also suggest you look at the age and history of the client.. That can tell us more than just a snapshot of the present. That longer view might have led us to discount Plan C, and to a lesser extent Plan D. However, several of you saying C and D brought up points worth considering, such as...

After the summary, Sylvia introduces a new situation: "Let's look at another case, this one a bit more complicated..."

What is Team-Based Learning?

In the classroom described above, Sylvia has created conditions where her students can apply their preliminary comprehension of course content to practice their thinking and gain deeper understanding of the subject matter. She has built a 3-day (4.5 hours class time overall) learning sequence—1) reading, 2) assessment of reading, 3) structured group analysis and decision, 4) whole-class discussion with instructor facilitation and feedback—around getting students to **ACT decisively and concretely on their own** in the kind of situational complexity they might one day face as disciplinary experts or as professional decision-makers.

Our example came from a course in Physical Therapy, but the same principles apply to any discipline. For example, if we had shown a classroom from a History course we would follow the same pattern:

1. Students read to acquire preliminary knowledge of events, people, and historical circumstances, as well as knowledge of historical principles, theories, arguments, perspectives and ways to conduct historical inquiry.

2. Students take a short test (first individually, then in teams) to verify their basic familiarity with and preliminary understanding of what they have read.

3. Students working in teams are presented with a situation that requires them to compare claims, arguments, or artifacts and make a specific, choice/decision about these materials using knowledge to inform their judgements.

   (In a history course students might typically compare interpretations or evaluations of a document or event; or competing, contradictory historical accounts; or theoretical arguments in support of various interpretations.

   In a trades course students might be asked to diagnose a mechanical failure or evaluate a work outcome based on industrial specifications or standards.

   In either case the teams work to analyze the given circumstances of the challenge, then make a claim in the form of a decision within parameters created by the instructor.)

4. The groups' claims are compared through whole class discussion, where reasons and evidence are surfaced in support of the various claims.

5. The instructor facilitates the discussion and provides feedback at the end of the discussion.

Through the use of carefully designed **application activities** (#3 above) students are provided context for their learning, and are asked to apply concretely and situationally what they have learned generically and abstractly from the readings.

Connecting abstract concepts from the readings to specific decisions and choices during the team application activities is critical for consolidating student learning and deepening their understanding.

Our job as instructor is to find or create these situations, cases and scenarios where what students "know" abstractly (via their readings) is put to the test when they try to "use" it to address a specific challenge in specific circumstances.

Learning to use course content to inform thinking and make autonomous decisions relevant to one's content is the central learning outcome of a Team-Based Learning course.

The social framework and diversity of perspective provided by the student teams support the outcome of improved decision-making. The special TBL format of team application activities (see "4-S" below) ensures that students are fully motivated and receive "immediate feedback" to improve their thinking in the choices or decisions they make.

Using Learning Outcomes to Drive Changes in Student Thinking and Behaviour
One underlying principle of Team-Based Learning may be counter-intuitive at first to some instructors. In more traditional classroom settings it's a common assumption that if we can get students to adopt productive behaviours (read, prepare, take notes, attend class, pay attention, take an active role during discussion, meet deadlines, do your homework, etc.), then we can help them improve their learning. We may even go so far as to impose penalties or adopt incentives, whereby we try to coax or coerce these behaviours.

However, when we focus directly on "behaviours" rather than "outcomes," we can suddenly find ourselves on a slippery slope toward policing and parenting rather than coaching and mentoring.

Team-Based Learning classrooms focus on learning goals (outcomes)—and performance related to those goals. This allows them to create a culture of fully adult learning.

If we make the expected outcome clear, indicate what a successful performance looks like, design relevant learning activities for practice, and provide tools and processes for feedback and self-assessment, students will figure out for themselves which behaviours are effective or not.

Once students take responsibility for their own performance and have the feedback that allows them to self-assess, they will usually abandon behaviours and attitudes that undermine success. It is common to see first-time TBL instructors look on with amazement when most students, without being coached or coerced, adopt the habits of careful preparation, regular attendance, and candid, respectful, productive communications with peers.

What makes TBL work?

Protocols are the means by which professionals, such as doctors and nurses, lawyers, tradespersons, teachers, etc. navigate highly complex situations, where simple formulas, "tips," techniques and rules of thumb are inadequate for the kinds of decisions that must be made.

Team-Based Learning provides **instructional protocols** for navigating the many shifting variables related to engaging students and promoting their learning. When understood and respected, the protocols help any instructor—even one with little or no prior experience in the

classroom—consistently create rich, engaging student experiences, in a wide range of classroom situations, in any discipline.

Consider an analogy with aviation. An airplane pilot follows specialized protocols in order to land her airplane safely every time—in just about any set of circumstances. These protocols include multiple steps, often in specific, pre-determined sequences, each one contributing to the stable, safe descent of the airplane, in consideration of many variables, such as weight, elevation, wind direction, speed, other approaching planes, messages from ground control, etc. Following these explicit protocols— with each step supporting specific dimensions of safety and stability— allows a pilot to accomplish the complex goal of landing a plane securely in a wide range of changing or even hazardous conditions.

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Teaching and learning are, like flying, surgery, or culinary arts, highly complicated. If you want to have full student buy-in, vigorous class discussions, and deep learning, remember that these outcomes are the result of multiple causes and conditions. No single technique, practice or condition can sufficiently account for everything that goes wrong or right when there are so many variables. Using reliable instructional protocols is the way seasoned professionals navigate complex situations—such as a post-secondary classroom with dozens of different egos, each with many different competing needs, interests or other motivational realities.

CAUTION to NEW ADOPTERS: The protocols of TBL allow flexibility, but improvising major changes to the protocols, without the experience of seeing how those changes will affect the "chemistry" of the class downstream, can lead to rough landings. When faculty struggle with a TBL implementation, it's often the result of an overlooked element within the protocols, or the introduction of practices that, by accident, work against the TBL dynamic.

Here is one example: getting students to gel as a team is not something that automatically happens when putting students in groups and asking them to work together. Specific conditions need to be created—by design—to ensure that it happens. One of those conditions is permanent team membership so that confidence in team members and confidence in the team's ability can develop over time. Frequent remixing of student groups—a technique often seen in cooperative learning classrooms—might look desirable in the interest of "diversity of interactions," but this ensures that students will have inadequate experience as a group to develop trust in other members and confidence in the group's capacity overall.

Here is a second example: in a TBL course students are required to read and take a low-stakes test (first individually, then as a team) on what they read, **before** the instructor explains it. This protocol is called "Readiness Assurance" (to be more fully explained later). Some students may resist the idea that they are responsible for content before the instructor processes it for them. Many instructors will experience discomfort from this resistance, and may seek to relieve the pressure from students by giving them a "helping" lecture before the test.

This seemingly student-friendly change of protocol—to alleviate student resistance and its accompanying instructor discomfort—creates unforeseen problems and will have negative psychological repercussions later on, in surprising ways.

Here's why: the Readiness Assurance Process looks like a typical "accountability" stick, but it does much more than check whether students completed the reading assignment. **The Readiness Assurance Process is the critical first step in socializing the teams—*which occurs only through a certain amount of student discomfort and struggle.***

If teams are to bond, they will need a shared experience of struggling and succeeding together. This occurs when teams are faced with real challenges that are beyond the ability of any single individual. When the team performance on the test beats any individual performance (which is almost always the case), the team effort is validated and team cohesion grows. Over the course of several Readiness Assurance cycles, students gain confidence, begin to strengthen their sense of personal responsibility toward their teammates, and increasingly realize that they need to come to class prepared in support of the team.

This indirect pressure to prepare—in order to support teammates—is another critical by-product of the Readiness Assurance Process. Preparation helps students enter into their teams as equals with individual competence and mutual respect—fundamental conditions for high-performing teams. When teams fail to gel by mid-term, the reason can often be tracked back to an underperforming Readiness Assurance Process. When students feel that other team members are not prepared and are not pulling their weight—what we commonly call "social loafing" or "hitchhiking"—resentment builds and undermines the team's cohesiveness.

In non-TBL uses of student collaboration, this is the number one fatal error: *failing to ensure that individuals are sufficiently prepared on their own—before they interact with their group.* Students who arrive prepared are able to grow into respected, reliable, responsible team members. Students who have not made the effort to prepare are much more likely to trigger team dysfunction.

In short, a TBL instructor needs to stay fully aware of how the various protocols and practices of the method are interdependent. Even though it may feel constricting initially, we recommend that instructors new to TBL adhere to the protocols as closely as possible throughout the first implementation, before improvising changes. Doing so will help you "land

the plane" reliably, and navigate toward a classroom that fully promotes student buy-in, student self-sufficiency and high-impact engagement with your content.

Later, like a master chef who is able to improvise on a recipe without violating principles of food chemistry, it should become clear where creative or discipline-specific variations can be introduced without ruining the mayonnaise.

In passing, we should report this anecdotal finding: we hear from veteran adopters of TBL that, the longer they teach and the more success they find with TBL, the more tightly they hew to the original basic protocols.

The Core Dynamic of a TBL Classroom

At the heart of TBL is a specific flavor of learning through collaboration: "collective decision-making," often in the form of a "specific choice" made within limiting parameters or framework. This slightly compressive framework adds energy to students' work, and also has the purpose of ensuring that students will work with specific course content to reach targeted course learning outcomes.

When well designed, a TBL experience validates for students the natural diversity of thought that they bring with them, but then requires them to negotiate with one another in order to arrive at a collective, collaborative singularity of action. The winnowing down of many perspectives into a single decision that all team members will share responsibility for is the dynamic process that teaches.

Not only will students be exposed to the content in multiple ways and from multiple perspectives as part of this negotiation, they will also develop social and communication skills. Students will have to listen to one another's reasoning and agree or respectfully rebut it, or filter and fuse together diverse perspectives, until the best ideas emerge to shape the decision. The practices and protocols of TBL are designed to support and foster this process.

The TBL Framework: 5 Pillars of Practice

TBL is conceived as a whole course design and management strategy, not a set of discrete techniques to be sprinkled here and there.

As a method, it is not complicated, but it relies on a consistent commitment to **5 pillars** of imbedded practice, each one reinforcing the conditions needed for student learning at a high level:

A. **Permanent groups formed by the instructor**

B. **Readiness assurance**

C. **Assignments framed as collective team decisions/choices**

D. **Natural and timely feedback imbedded at multiple levels**

E. **Course Policies promoting student self-determination and accountability**

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Each of the pillars is elaborated below, following the description of the primary TBL Learning Protocols.

Basic TBL Classroom Protocol: Step by Step

TBL course design integrates several key components, which are managed in a specific sequence that will be repeated several times over the course of one typical semester. On average, each module extends over 2-5 class meetings (3-10 hours class time, total), depending on depth of content and length of class meeting time.

TBL activity sequences are not "stand alone" elements to be inserted or added to separate lectures. They are the entire course.

In most cases, 4-7 modules/cycles constitute the totality of a TBL course. Compressed courses might require fewer modules, or a shorter timeline for each module. Year-long courses (more common in Trades education) will be composed of a larger number of modules, but will retain a rhythm similar to that of other courses.

Immediately after Day One of a course, once the permanent teams are formed and students have been oriented to the TBL Model, it's time to launch the first learning sequence:

Step One: Students Read/Watch (outside of class, before the in-class part of the module begins)

Step Two: Readiness Assurance Process (RAP) (in class, 60-90 minutes)

a) Students take the **individual** Readiness Assessment Test (iRAT) on the assigned readings (closed book, in class) *before any lecturing by instructor.*

b) Student teams take the **team** Readiness Assessment Test (tRAT) (closed book, in class, same test) *immediately after the iRAT.* Students do not see the results of the iRAT before taking the tRAT.

c) Students make **appeals** on unfair, erroneous or ambiguous questions (open book, in class—but evaluated by instructor outside of class).

d) Instructor offers clarifications and emphasis in a Q&A or mini-lecture, if needed, and addresses lingering confusion and uncertainties about the content), based on results of the RAT.

Step Three: Team Application Assignments (several hours class time, usually over multiple class meetings)

- Students work in their teams to apply content to make analytical decisions (open book, in class). Application assignments can be short activities (10 minutes) or long (the entire length of a class meeting), depending on complexity, depth and purpose.

- After teams reach their conclusions for each application assignment, instructor facilitates discussion among all teams, to compare team responses, probe their understanding, and foster team-to-team debate/discussion.

Step Four: Individual Homework (as needed between class meetings)

- Students continue to read supplemental materials, problem-solve, write or practice *individually* using content (homework outside class). In TBL, teams are not required to meet outside of class.

Step Five: Assessment of Learning (may not be necessary or appropriate for every module)

- Traditional instruments (tests, papers, projects, etc.) can be used for individual assessment (in most cases)

- Specially formulated "capstone" case analysis or team projects can be used if some assessment of learning by team is desired

- Assessment can include individual or team assignments, or a combination

Best Practices for the 5 Pillars of TBL

Pillar A: Team formation

Teams are the social motor for learning. Ensuring that teams perform well is not a trivial concern, and the key is in design and set-up. Teams do not need special training in how to collaborate, or special team-building exercises when the conditions are properly set by the instructor.

Here are the key "socializing" practices for TBL instructors.

1. **Teams are permanent over the whole term.** Some teams will gel right away, but others will need several weeks before members learn to work well together. Remixing, however, will not solve the problems of a dysfunctional team. Moving problem students around merely moves the problem to a new location. For long courses that extend over a whole year, a mid-year remix may be effective and help freshen the experience, but don't be surprised if some teams resist the remix. If they have bonded as a team, they will be reluctant to give up what they have built.

2. **Teams need to be formed immediately at the outset of the course (on day one, if possible; by day two, at the latest)** to communicate clearly the new expectations. Delaying the assigning of members to teams increases the likelihood of student resistance to the idea.

   Have ready a plan for determining how late-registering students will join existing teams. *Avoid creating teams made up of all late registrants—it's best to distribute latecomers among existing teams.*

3. **Team membership needs to be assigned, not self-selected,** to establish a sense of fairness and to weaken existing alliances. It's best if the team formation process can happen face-to-face, in public, using clear criteria (see #5 below). Transparency contributes to the trust and confidence needed for rapid team cohesion. However, for large classes it may be necessary to create the teams electronically before class.

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4. **Teams need to be large (optimally 5-7 members)** in order to have sufficient diversity of perspective and adequate depth of human resources. Small teams (<5) suffer from lack of diverse perspectives and lack of total brainpower. This causes them to work superficially and converge too quickly on simplistic or underdeveloped solutions. Groups that are too large (>8) can be slow to gel as a team and can take an excessively long in class to converge on a collective response.

   If class enrollment is in flux early on, be sure to make teams large enough to absorb loss of membership. Err on the side of too large rather than too small (8 is better than 4).

5. **Team formation should—when possible—ensure even distribution of student "assets" (as well as liabilities) relevant to the course outcomes.** For example, in a course in environmental science, you might want to distribute students who have had multiple courses in chemistry or biology. If you have several international students working in a second language, you might want to try to ensure—discreetly!—they are not all in the same group. In a management course, you might want to distribute students by years of work experience.

6. **Teams can often benefit from giving their team a name,** to reinforce their identity. Using this name regularly in classroom conversations can further help with the process of bonding. The naming process at the beginning of the course can also be a good early decision-making activity for team social development.

7. **Teams need to be assigned an engaging, decision-based team activity as soon as they have met for the first time.** This practice has multiple benefits: it promotes the team bonding process; assures students that dreaded "group work" will be an asset, not a liability; and builds confidence in the way the course is designed. Some possibilities:
   - Doing a mini-RAP on the course syllabus is a reliable activity for this purpose.
   - Assigning a "naïve" first-day "make an educated guess" activity based on course content. This type of challenge can work well, both for team-building and for creating excitement around the content. (See 4-S activity design, below).
   - Deciding on grade weight distribution between iRAT vs tRAT.
   - Deciding on criteria for measuring "helping behaviour" during peer evaluation.

Pillar B: Readiness Assurance

The protocol for the Readiness Assurance Process (RAP) includes 5 steps which are most powerful when they occur **face-to-face** and **in immediate succession**. Each element of the RAP has *at least* one critical objective, and therefore should not be omitted:

i.   The **iRAT (Individual Readiness Assessment Test)** is a short, closed-book, multiple-choice test that holds students individually accountable for their own efforts to engage initially with course content. The iRAT lays the groundwork for effective participation by all individual team members.

ii. The **tRAT (Team Readiness Assessment Test)** is a repeat of the exact same test, also closed-book, written immediately after the iRAT, but taken as a team. Teams take the tRAT before knowing the results of the iRAT. The tRAT fosters team skills by requiring debate and negotiation, and furthers team development by showing students the value of their teams, who almost always outscore any individual.
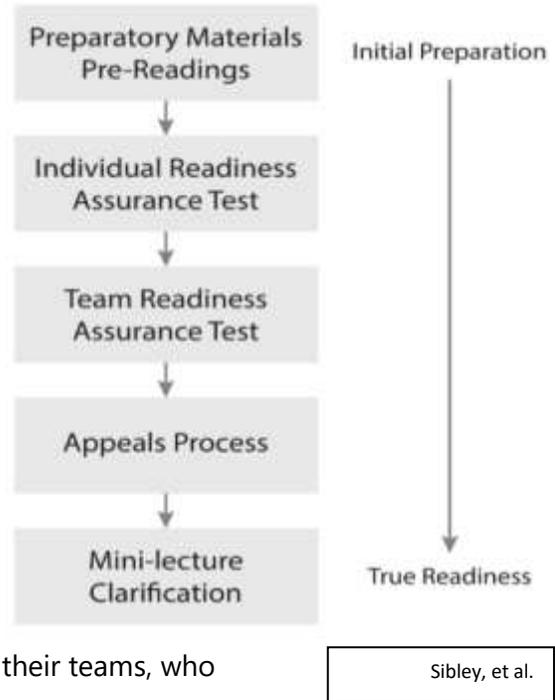
"Immediate feedback" on team answers can accelerate team bonding. Several high and low technologies have been adapted for this purpose.

At the low end is the use of invisible ink marked over each correct answer, so that when a team chooses that answer it becomes visible and signals success. Another paper-based solution is the scratch-off (IF-AT™) answer sheets (originally sold by Epstein Education—but now in the process of being sold under a different name). Some learning management systems, such as Moodle, can be adapted using a "multiple attempt" function. Almost any survey tool (Survey Monkey, Lime, Qualtrics, etc.) can be adapted using the question branching function.

If you do not want to spend time learning or adapting these technologies, just administer the two tests in succession, using individual answer sheets for the iRAT, and a single team answer sheet for the tRAT. Collect the iRATs when students are done, then distribute the single answer sheet per team. While teams are engaged in the tRAT, you might have time to mark the iRATs, using a transparency key or a scanner. If not, return them at the next class. When the tRAT is done, you can simply project the answer key on a screen and ask teams to trade and score the team answer sheets.

iii. **Posting tRAT scores** publicly on the board can be an effective source of feedback. Students benefit from seeing how their team performed by comparison with the other teams, and this practice can be used, in the spirit of games, to promote an element of friendly competition among teams. If you are not fond of this lightly competitive element,

at least post the range of tRAT scores for students to see, without indicating the names of the teams. It can also be motivating to show students the gain on average between iRAT and tRAT scores.

iv.   The **Appeals** process immediately follows the posting of tRAT scores, and invites teams (ideally during the same class as the RAT) to challenge test items that may be flawed, ambiguous or otherwise unfair. This practice promotes critical reading and encourages student ownership of learning. Give teams 10-15 minutes to develop appeals. Teams must submit their appeals in writing and provide evidence and sound reasoning for each appeal. Appeals are evaluated by the instructor outside of class, and returned the following class or by email.

v.   The instructor's **Clarification**, after the submission of appeals, usually takes the form of a Q&A, a class discussion or short mini-lecture, if needed. This step allows students to get expert feedback *directed to their specific questions,* but should not turn into an extended lecture. ***Do NOT review the whole RAT and do not do a general review of content.*** At this point students will already have covered the content multiple times through their preparation and the RATs. Discuss only the questions that everyone missed or the topics that students identify as still being difficult. Also, remind students who seem demanding in wanting answers on every detail, that they will revisit the content within the context of the application activities.

Key practices for Readiness Assurance

1.   **The RAP occurs only at the very beginning of every module of the course**. (A TBL course typically has 4-7 modules—hence, 4-7 RAPs—in contrast to many traditional courses that are organized by 12-15 separate, weekly units of content).

2.   **Do not administer the RAP more often than ~7 times in a typical semester.** Overuse of RATs (like overuse of any graded assessment) will visibly erode student enthusiasm and motivation for your course.

3.   **The reading amount for one RAP needs to provide enough substantial content** to feed team application activities over one whole module (multiple contact hours). The actual amount will vary discipline by discipline and by density of material, so a reading assignment could be 20-40 (dense, highly technical) pages on the low end or 100-300+ pages (such as a whole collection of articles, several textbook chapters, or a whole novel) on the high end.

Depending on course level, it may be necessary to show students early in the course how to read strategically, for broad, contextualized understanding when faced with larger reading assignments. This could mean showing students how to look for organizational cues in texts,

and how to make marginal notes to help understanding and retention. Giving students "reading outcomes" for each reading/watching assignment is also recommended.

4. **Readiness Assessment Test questions should target student familiarity with important concepts, not picky details.** RATs are not comprehensive exams, but rather a small *sampling* of preliminary student understanding of key ideas and critical differentiations. 10-15 items are generally sufficient. A small number of high quality, carefully written questions is the best approach.

5. **Both the iRAT and tRAT are closed-book, in-class tests.** The richness of team discussion during the tRAT comes in part from the members' struggle to reconstruct from memory their understanding of what they read. Be careful that the RAT does not focus on narrow analyses with calculations, as these types of questions will be less effective in the tRAT discussion. Keep the questions mostly at the level of conceptual understanding and comparison/contrast of key ideas.

6. **RAT questions are always in a multiple choice** answer format in order to create the conditions needed for dynamic team decision-making during the tRAT. Open-ended questions do not force the kinds of debate, negotiation and fusion of thought that teams need to experience in order to develop as teams.

   (Alert to instructors in humanities and social sciences, where multiple choice questions are sometimes dismissed as too trivial to measure learning: the RAT is not an actual measure of learning—it is more of a "playful provocation," a check to find out if students have made an adequate first-pass at the content on their own. True evaluation of learning will occur elsewhere.)

   There are many clever ways to adapt multiple choice formats to substantive, highly complex uses. For instructors new to the use of multiple choice, it will be worth a little research to find creative and challenging examples. Sample questions from testing resources such as Princeton's Scholastic Aptitude Tests (SAT) can be useful for generating ideas about questions that test at a higher cognitive level. There are also many internet sites which present examples of questions types for different cognitive levels and different types of content coverage.

7. **Within one RAT, questions should be distributed over levels of difficulty.** See resources on Bloom's Taxonomy for ideas on writing questions at different levels. A few items should be relatively easy and straightforward, to build confidence; a few items need to be more complex and nuanced enough to elicit team discussion.

8. **RATs should be challenging, but not ego-deflating.** However, it's better to administer RATs that are slightly too difficult rather than too easy. Too easy invites boredom because there's nothing at stake—and one really gifted or diligent member can carry the team. Excessively hard means loss of motivation as students can feel that success is out of reach. Target individual scores averaging 50-70%, with team score averages targeting 85-100%.

9. **RATs should be administered with time limits.** Teams will discuss questions all day if they do not have a limit. A highly visible timer (using an egg timer or projecting an electronic timer on the screen) can help students self-manage.

   A 10-question iRAT administered on paper can usually be taken in 10 minutes, depending on student population and question difficulty; the tRAT discussion for the same test will generally need 20 minutes or more. It's important to keep some gentle pressure on students, so aim for the low end, then adjust upward if needed.

   A good rule for keeping students on track during the tRAT: ***once half the teams have finished, the remaining teams have just two (or some fixed number of) minutes to finish.***

   Or, alternatively, once the first team finishes, the remaining teams have 5 - 10 minutes to finish.

10. **It is recommended that tRAT scores** (but not iRAT) **be published** on the board or screen for the whole class to see, as part of the feedback process. This allows teams to monitor their own learning and creates a playful atmosphere. In many cases students will alter their expectations of themselves, change their team decision-making process, and increase their commitment to preparation when they see that other teams are doing substantially better. Teams who learn that they are doing better than other teams will develop greater confidence in their team's ability and therefore greater confidence in one another.

11. **The Appeals process should be conducted during the same class meeting in which the RAP occurs.** Do not skip the appeals step and do not make it appear optional or unimportant. Students need to develop the expectation that they, alone, are responsible for evaluating the quality of the RAT as a measure of their preliminary understanding of the reading.

   An additional note about appeals:

   Do not ask, "Are there any appeals?" Rather, create the expectation for appeals. At the end of the tRAT tell students they have 5 minutes to determine which items they wish to appeal. Then give them another 10 minutes to write down and submit the reasons for the appeal.

   If some teams elect not to appeal any questions, have a new assignment or activity ready to keep them productive while the other teams finish.

Pillar C: Assignments Framed as Collective Team Decisions /Choices
Decision-focused team application activities are the single most important element of Team-Based Learning.

"Decision-Based Learning" would be a very fit alternate name for Team-Based Learning.

Well-crafted decision-based tasks require team members to conduct a comparative analysis of multiple potential solutions or responses to a complex problem, then resolve their individual differences by making—collectively—a single specific choice among possible options or within certain parameters, and defending that choice in the face of other teams' different choices.

A common successful approach is to ask students to take a rule or principle or theory and "test" it by applying it to a specific situation.

Because these kinds of decision-based tasks invite students to act for themselves and defend their thinking, decisions naturally generate curiosity, diversity of thinking, and engagement.

Note to instructors whose disciplines have traditionally been structured around either of the following two tendencies, which might seem to make "decision-making" less relevant to your course:

A.   "There are no right answers in what I teach, just different perspectives and opinions to discuss."
      or
B.   "In my field answers are usually either right or wrong—there is not much to discuss."

In Case A, which might include some courses in the social sciences or humanities, it's important to keep in mind that, while there might be few, undisputed, perfectly correct responses to a given question, there are often responses that are qualitatively better than others (e.g., more informed, better reasoned, more effectively argued). For TBL, one design key is to focus team activities around challenges that ask students to choose among "best arguments," "best evidence," or "best reasoning" for a given thesis, position, interpretation or conclusion.

In Case B, which might include some courses in science, math and technical or trades areas, the factual and theoretical certainty of textbooks can obscure the natural muddiness that is in the thinking process needed to apply scientific understanding to specific, concrete situations. Ask students to apply theory (principles, rules, etc.) to actual, real-world scenarios. For example, science students can be asked to predict the effects of a given action on a given situation, evaluate evidence, or choose the best interpretation or explanation of a given data set. In the trades or technical fields, students can be asked to decide on a best approach to a complex situation: whether or not certain outputs or performances meet specifications, or whether some solutions to a given problem are optimal, more

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Application activities that invite students to think and decide for themselves are the "pay off" of the course. Because students have fulfilled their part of the bargain and are prepared (via the Readiness Assurance Process), they now need the satisfaction of being challenged in

ways that allow them to see for themselves the usefulness and relevance of what they have studied.

Avoid asking for team decisions that can be carried out with knowledge alone ("trivial pursuit"). Also, avoid asking for decisions based on mere opinion, preference or taste.

Overall, team application activities need to be hard enough, and contain enough complexity or uncertainty, that the most diligent student cannot simply answer because he/she knows a lot. For this reason, *team application activities are designed around decisions that require students to use not only their new knowledge, but also their reasoning and their judgment.*

The protocol for developing Team Application Activities is called "4-S" (initially called "3-S" in Michaelsen's original writings): ***Significant, Specific, Same, Simultaneous.***

I.   Conceive the task so that it looks **Significant (**and therefore interesting) ***from the student's perspective***. This means that the task will honour student intelligence by asking students to think for themselves, to reach their own conclusions, while USING their new knowledge as tools in responding to specific situations. Seeing the immediate utility and relevance of what they have just read is highly empowering and motivating.

II. Require students to think comparatively and make a **Specific** choice among a given set of possibilities or a decision framed by a given set of parameters. This strategic restriction forces students to deal with the specific content and purpose you have targeted (competing priorities, values, arguments, interpretations, theories and the relevance of specific facts) in making their decision:

   What will you do first in the following specific situation...?

   Which of these specific writing samples is the best illustration of X thinking/technique?

   Which specific address in this neighborhood will you choose for building your restaurant?

   Which specific piece of evidence in this argument is most...?

   Which of these specific interpretations is most...?

   Rank these three specific solutions from best to worst...?

   What is the one best specific strategy you could use to accomplish X?

III. Require all teams to work on the **Same** task, so that, when they report their answers to the whole class, *their egos will be invested*, since they will have to compare their own team's response to those of the other teams—for immediate feedback. In this comparative framework, students will naturally and genuinely care about how the other teams responded.

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IV. Use report-out techniques allowing **Simultaneous** responses for all teams. When the teams have made a specific choice in relation to the same significant problem, and then discover *via* a simultaneous report that other teams made a different choice, they are both motivated and intellectually prepared to challenge other teams' answers and defend their own. The instructor then facilitates a comparative, analytical discussion of all answers, where the teams are asked to defend their thinking and respond to one another.

Proven best practices for *Design* of Team Application Activities

1. **Start with a verb** that represents a significant action requiring knowledge of course content (*evaluate, assess, diagnose, predict, interpret, resolve, rank, critique,* etc.). Do not design activities around low-level tasks such as "identify," "explain," "describe," "match" or "define".

2. **Find ideas for team application tasks by looking at what people who work in your discipline do with their knowledge.** Ask,

   • What kinds of problems do we try to solve?

   • What kinds of questions do we try to answer?

   • What kinds of thinking do we have to do?

   • How do we use our discipline's information and ideas?

   Ask your students to make the kinds of judgments, diagnoses, analyses, interpretations, evaluations, predictions and other types of decisions that you and other professionals or academics do as the regular part of your work. For example, from our opening story from Physical Therapy, "Look at the data summary provided for this client. Assess and rank the

various treatment plans according to their relevance in this case." From History: "Which of the various interpretations of this event is the most convincing?"

From the Trades: "Which of these repairs to the machine would you try first, given the conditions and circumstances?"

3. **Develop Team Application tasks that are based on responses to cases, scenarios, situations, problems, artifacts, actual research questions and inquiries.** The goal of a team task is to lead students to "test" and stretch their knowledge by trying to use it in complex, challenging, realistic situations *that they have not seen before*. *(Concrete situations and scenarios are useful because they introduce unforeseen variables and ambiguities that complicate the application of theoretical and abstract knowledge.)*

4. **Frame activities as decisive actions that students need to take in responding to these circumstances and situations that are new to them**, so students can struggle for themselves to discover the applicability, portability and impact of their knowledge.

5. **Ask students to analyze or assess objects, statements, claims, theories, arguments, representations, images and other products or tools typical of your field.**

6. **Team responses, including those applied to complex scenarios and questions, should be converted to a single, easily visible, focused representation**—letter; single word or phrase; point on a map; number on a scale; image; chart, graph—so they can be easily compared across all teams for immediate feedback during the Simultaneous Report phase.

A common technique for simultaneous reporting is to ask teams to reveal their specific choice responses using colored or lettered cards. This can also be done using blank sheets of paper, where students write down the letter, number, word, or phrase that represents their decision—and then hold them up at the moment of reveal.

Small, hand-held whiteboards also work for this purpose. Clickers can be used, but they are less effective than cards, since they do not communicate to the whole room each teams' ownership of their answers.

For responses where teams are asked to represent their decisions graphically (draw an image or chart) it works well to have teams record their work on poster paper, then simultaneously publish it by attaching it to the wall at a given signal. In these cases, students can then conduct a "gallery walk," in which they circulate the room assessing the other team's answers and developing challenge questions, before engaging in a whole-class, comparative discussion of all responses. For more details on these and other reporting techniques, please see Chapter Seven of *Getting Started with Team-Based Learning*.

7. **It may be useful to have at least _some_ team application activities count toward a grade.** Try mixing application tasks that are "formative" or "developmental" (no points) with occasional ones that are designed to be capstone-like "challenges" or "show us what you can do" tasks that are scored for points. This ensures accountability for the team's work. A good practice is to do a series of non-scored tasks leading up to the task that is graded. For graded tasks, ask the teams to record their response in writing, with a bulleted list to indicate their key points to justify their decision. This is what will be graded. The instructor collects the written responses, then has the option, if wanted, to debrief the activity in the usual ways, by asking for a simultaneous report by all teams, discussion of why, etc.

Proven best practices for M_anagement_ _of_ Team Application Activities

1. **Launch team tasks by projecting instructions and prompts on a screen, or by using paper handouts with one prompt for one activity per page**. This keeps you from having to shout over a loud classroom once discussion is underway.

2. **Ask students to think first individually to make their individual decision before unleashing them into a team discussion of the problem.** This will give all students a chance to gather their thoughts and gain confidence, mitigating dominance by strong personalities.

3. **Separate team tasks into clear, single decisions, present them individually, one by one per slide or handout, and discuss fully before moving to the next. _Do not_** assign teams a sequence of several tasks at the same time on a single sheet of paper, as this will suck all the energy from both the team and the whole class discussions.

   Instead, for long sequences of questions, consider alternating individual work (e.g., worksheets or problem sets) with focused team 4-S team decision tasks that require conceptual, convergent thinking that is built upon the individual work.

4. **Limit the time you allow teams for making their collective decision during an activity**, and if possible, use a visible timer (Power Point can be adapted to this purpose, and there are many online timers you can use). Tell the teams that they will need to produce an answer at the end of the given, announced time limit, whether they have finished discussing or not. You can add time discretely, if you find you have misjudged the time needed.

5. **Leave the teams alone while they are working on a task.** Move around so as to be seen, but not to be drawn into a conversation. Do not invite yourself into a team conversation. Politely deflect questions asking for special help. If a student from one team asks a question during a team activity, push it back to the whole team to consider, if possible.

If you have a small class with only one or two teams, leaving the room during the team discussion phase can be very effective in giving teams license to talk freely.

6. **If you need to clarify an element of an activity, clarify for the whole class, not for just one team, to promote the perception of fairness.**

7. **Make the simultaneous report <u>crisp</u>**. (On the count of 3: 1-2-3...SHOW). This will help students see and benefit from the immediate feedback provided by other teams' responses, and will reduce fudging by teams who are uncommitted.

Proven best practices for *<u>Facilitation</u>* of Team Activity Discussions

While 4-S Activity Design helps ensure student engagement in higher levels of thinking, ***the actual learning itself is dependent upon effective whole-room facilitation by the instructor***. The facilitation of discussion among all teams frames and fosters the in-depth analysis, feedback and reflection. This all-class discussion phase will require the most time of any part of the TBL process.

The instructor's role should be that of inquirer—not director, not "teacher", not expert with the answers, not judge. If the team task is designed to allow for independent thinking, your role will naturally evolve to that of conversation partner, traffic manager, and questioner.

Teams need to be invited to explain their reasoning **to the other teams**, and ask them to defend it *vis-à-vis* the claims, arguments and evidence provided by other teams. An effective facilitator will play teams to respond to each other (Did your team come to the same conclusion as Team 5? Why not?), rather than just interact with a given team.

Setting up debate in this way is a function of facilitation: "It sounds like your team does not agree with what Team X just said. Explain to them (and everybody) why you think you are right."

Here are a few guidelines for facilitation.

1. **The first question after a simultaneous report is always some form of "WHY?" directed at one of the teams.** The second question will be directed to a different team: "Team 1 said X for reasons A and B. Why did you answer differently?" Continue this process, probing more deeply into each team's thinking, as you collect the reasoning of all the teams.

2. **Avoid probing too deeply with the first team to respond.** Make sure you get all the perspectives in the room into the conversation before you move toward deeper analysis with any given team. In most cases, the teams, themselves, will provide the analysis as they respond to each other.

3. **Cluster team answers when they agree**. If three teams hold up the same answer, collect reasons from one of these, then ask the others if they have something to add (Don't proceed one by one). This avoids tedious, repeated explanations.

4. **It does not matter if all teams agree** and report the same answer. The learning occurs during the discussion. *Teams may have different reasons for arriving at the same answer*. Your first response to a simultaneous report, no matter the spread of team answers, is always some version of "Why?" directed at one of the teams.

   You can also delve more deeply into the other teams' thinking by asking a second or third team why they did not choose any of the other options that they discounted.

5. **Keep a poker face during facilitation**. Maintain the appearance that all responses could be valid or correct until all have been explained by the teams who represent them, and other teams have had a chance to offer their critiques. Many an excellent discussion has been undermined by the instructor tipping her hand as to what she considers a "correct" or best answer to be, even before all the teams have finished reporting. It's good practice to let students go quite a ways down a wrong path, to fully expose their reasoning. When it's finally time for your feedback, point to the strengths of the various team responses, even while pointing students towards what might be a "best" response, and why.

6. **Vary your order of collecting team answers**. If you always start with the worst one, students will catch on. Sometimes start with the best one. Starting with the minority opinion is often a good strategy, as it ensures that unpopular or unusual arguments will be heard.

7. **Close the discussion by pointing to what has been learned**. Make sure to indicate any merit in students' arguments, even if their overall reasoning was flawed.

8. **If a final, correct or best answer needs to be presented, offer it as "this is what the experts would say, and here's why,"** so you, personally, will not always be identified as the only source of knowledge and authority.

Pillar D: Natural and Timely Feedback

Seeing for ourselves the consequences or impact of our own thinking and actions is the most powerful teacher that exists. This is the psychology that informs game design, and it is critical for TBL.

Games, like TBL classrooms, are learning systems, where each action by a player (or team of players) generates consequences that provide the feedback that teaches. A hockey player shoots at the goal and watches to see if the goalie can stop the puck. A poker player makes a bet and watches to see how the other players respond. A video gamer watches how opponents on the

screen respond to moves, then alters his strategy. In any game, a player watches and responds to the effects of his actions—immediate, natural feedback—then takes what he has **_learned_** into consideration when planning future moves.

> ***TBL protocols and practices are specifically designed to create classroom conditions for lots of embedded, natural, feedback.***

When the feedback to a team is positive ("We made a great case for our position!" "We got it right!" "We scored really high on the tRAT) it validates team decisions that are sound, and therefore helps the team bond through greater confidence and a stronger sense of identity. When the feedback is negative (for example, when the team misses a question on the tRAT) it can have a useful corrective effect, and help team processes by affecting members who have been either too assertive or too quiet.

When teams receive feedback that their choice is inadequate, members who may have had good ideas but were reluctant to speak up while the choice was being made realize that they let their team down. Further, even if none of the other team members realize that there was missing input, the quiet members recognize the negative consequences of their inaction, and are motivated to speak up in the future.

Also, during 4-S activity and discussion, when team members are struggling with getting an overly assertive member to listen and have therefore ended up with a problematic team answer, the immediate feedback provided by the entire class in the simultaneous report and subsequent discussion helps them make their point.

Here are the 3 primary situations in a TBL classroom where intense, natural immediate feedback is naturally generated:

1. **Immediate feedback will occur for individuals, when transitioning from iRAT to tRAT.** When students finish their iRAT and turn to the tRAT, they are bombarded with immediate feedback as they begin comparing their own answers with those of their teammates. Disagreements among team members lead immediately to analytic inquiry (I said B; Why did you say A?) and self-assessment (Am I sure of what I read, understood or remember?).

2. **Immediate feedback will occur for teams through the tRAT process.** The tRAT makes the consequences for team decisions immediately visible. This ensures that a team will assess its effectiveness at the end of each negotiation leading to an answer or set of answers. The immediacy of the feedback allows team members to evaluate the effectiveness of their own decision-making, and to change any behaviours—either collectively or of individuals—required to improve the performance on subsequent items.

3. **Immediate feedback will occur for everyone during team application activities.** The formatting of 4-S team application tasks for "same-problem + simultaneous report" is specifically conceived for generating immediate feedback.

   "Same Problem" ensures that, however the teams respond, their solution will become relevant feedback for the other teams.

   "Simultaneous Report" ensures that each team will see immediately where they stand vis-a-vis *the other teams. No one can hide from his own thinking.*

The simultaneous reveal provides a critical opportunity for self-assessment, based on feedback. When a team is alone in its report of a specific answer, it immediately feels challenged, and will respond in a variety of ways, all productive. The team might argue forcefully and find value in defending its thinking *vis à vis* the other teams. If the team felt unsure to begin with, the soul searching begins when team members see the responses of all the other teams.

Because teams have had to commit to an answer and report it in public, however, they have no choice but to make their case. In some situations they will be vindicated, as the minority position may turn out to be a good one.

For facilitation purposes, it may help to start the all-team class discussion with any team with a unique answer—unless you know that that team is a ringer. This will ensure that the team is heard. A team that is outnumbered will be hesitant to answer if the majority response has already dominated the discussion.

Pillar E: Policies for student self-determination and accountability

Post-secondary students, who are mostly adults or adolescents, deserve to be honoured as adults by how we design the learning experiences provided by our courses. This means ensuring they experience the autonomy to act on their own reasoning and judgment, based on knowing what is expected of them, as related to a stated goal.

This philosophy is a conscious shift away from compliance-driven practices characterized by trying to coerce student behaviour through rules and regulations. A well-managed TBL course ensures that students ***own*** the course and therefore own their actions and behaviours as independent agents within the course. As a result, not many top-down rules will be needed.

Students are assumed to be self-motivated (even if they don't appear to be on the surface!), intelligent, capable, responsible individuals, and are, accordingly, objectively accountable at multiple levels. If you have students who do not appear this way at the outset, it's important to behave ***AS IF*** they are, so that you are reinforcing the idea of productive behaviour and smart personal choices, rather than sending signals that you are frustrated or disappointed.

It may take some students a bit of time to recognize their own responsibility for what happens in the classroom. There will be occasional students who never arrive at this realization, but as long as they are not disruptive, don't worry too much about them. You will still have a large majority of students who are pleased that the course challenges them meaningfully and allows them to think for themselves. These will all be willing participants in the journey.

Here are key practices that promote a learning culture for adults.

1. **Course policies are written so as to place students in the role of "independent agent" acting in his/her own interest.** To achieve this culture means communicating to students the **choices** they are free to make, and the **consequences** that come with those choices, whatever they may be.

   a) Eliminate "attendance requirements," but replace them with "productivity accountability." Students who choose not to attend class are free to do so, knowing that they accept as a consequence their loss of the opportunity to receive credit for important work done during class. We recommend making sure that something significant gets marked and recorded *in class* with some frequency. Class time is when learning occurs, and grading practices should reflect that reality. Some 4-S activities can serve as small ongoing assessments that replace "participation" marks.

   b) Eliminate "make up" assignments. Instead, give students license (and choice!) to drop a small, fixed number of scores in each category of their grade, so that *they* can be responsible for managing their own options to do or not do an assignment. (You'll also need policy language to deal with what happens in dire cases of catastrophic illnesses or accidents).

   c) Rather than penalties, provide students with assignment deadlines expressed as choices tied to levels of eligibility to receive points. For example, assignments submitted by a given date would be eligible for specific point values; assignments submitted on a later date would be welcome, but eligible for fewer points. Avoid punitive language for late assignments or other infractions.

   *Penaltie*s are perceived by students as the instructor's arbitrary exercise of authority and control. Eliminate penalties. Instead, build your policy structure around the choices students are free to make, knowing that they—and they alone—are accountable for the consequences.

   d) Eliminate "I" and as many references to your instructor role as possible from your syllabus. The course is the students' journey, and all activities need to be expressed in what the students will do and for what purposes.

   e) Explain in the course syllabus (and make sure students read it—such as through a first-day "practice RAT" on the syllabus) how the course gives students the tools and

responsibility to manage their time as they find necessary. Explain to students at the beginning of the course how the "you are your own boss" policies work. It's not a free pass, and this nuance needs to be surfaced. It's important to reinforce verbally on Day One your expectations for them to make their own decisions and deal with the consequences that follow from those decisions.

2. **Students have the right (and responsibility) to evaluate their teammates' "helping behaviour"** as a part of the course grade. If students are going to become fully responsible and accountable for their own and their team's learning, it is only fair that they have some leverage to motivate their peers to be effective partners, and hold them accountable if need be.

    a) The Peer Evaluation of Helping Behaviour component of the final course mark should be small, somewhere around 5-10 % of course total. The amount needs to be high enough to potentially influence at the margins a student's final grade for the course, but not so high as to directly determine the final grade, by itself.

    b) Spend time on Day One or Day Two of the term assisting students in determining the criteria to be used in assessing peer helping behaviour. This works well as a team activity on day one or day two. See Michaelsen, Knight, and Fink (2004), for a description of the fishbowl exercise often used to establish behaviour criteria for the whole class.

    c) Schedule a first, formative peer feedback and evaluation exercise approximately 1/3 way in the course. Use this activity to allow students to provide feedback to one another, with no points at stake.

    d) For the final peer evaluation, choose a process that requires students to differentiate among individuals in assigning scores to their peers. This can be done by giving students a specific number of points to distribute to team members, based on their relative contributions to the functioning of the team. Software such as iPeer is now available to help conduct this process online.

    e) Be sure to differentiate "peer evaluation" from "peer **evaluation of helping behaviour**" when discussing this practice with colleagues. Some of them will not understand your intentions. You are not asking your students to evaluate academic performance of their peers, which is outside students' frame of responsibility. You are asking them to evaluate the effectiveness of their peers as helpers **to them** in the learning process, a task for which they—and they alone—are uniquely qualified. The "helping behaviour" score is based on what students experience, not on what the instructor observes.

3. *The overall grading scheme includes weights or percentages for individual work, team work, and peer evaluation.* The specific weights will vary from course to course and from

instructor to instructor, depending upon learning outcomes and the students' frame of reference. The culture of the institution and age or maturity of the students, for example, might affect the grading scheme and weighting strategy you use.

a) As a rule of thumb, make sure that well over half of the aggregate student grade comes from individual work, to ensure individual accountability, and the rest from team outputs. It is recommended for new adopters to start with a target weighting scheme of approximately **70% for overall individual work** and **30% for overall team-based components**. As you become more comfortable with the TBL model, you might find reasons to shift the balance of weights in one direction or the other, but it will most often be the case that students need to demonstrate individual achievement in order to justify their course grade.

b) (Optional, but recommended) Give student teams the opportunity to determine at least some of the grade weights (within parameters you give them) during the first week of the course. A common, minimal practice is to let students decide the weight of the iRAT vs the tRAT. Let them choose, for example, a 50-50, 60-40 or 70-30 weight split, in either direction. **All teams have to agree to the same weighting scheme** to make your grading manageable. You might do this after they have experienced the first "practice RAT" so that they can take into account the power of their team in outperforming individual team members. See Sibley *et. al.* (2014) for elaboration on this procedure.

As you become comfortable with this process, you can ask the teams to help you determine the value of grade weights for the whole course, within certain parameters. A description of how to do this can be found in Michaelsen, Knight, and Fink (2004).

c) Make sure that some of the daily team application activities result in a score that counts toward the course grade.

Here is a sample grading scheme for a TBL course. Note that there are several traditional components. Individual tests and papers, for example, can still be part of a TBL course.

20%	RATs; (Individual vs. Team fraction of weight to be determined in class)
10%	Weekly in-class team activities (instead of "participation")
30%	Individual in-class Essays/Midterms
25%	Final Individual Essay or Final Exam
10%	Capstone Team Case/Situation Analysis /Project
5%	Team Member Performance (Helping behaviour--peer graded)
100%	Total

This will work!

The first implementation of a TBL course can be an invigorating and satisfying challenge. Don't worry if you don't hit all the marks perfectly the first time you use TBL. A less-than-perfect implementation can still be extremely effective. And don't be deterred by the few students who may struggle in response to the new expectations you have communicated.

It's perfectly natural for a few students to push back at first—this is a positive sign (and a badge of honour!!) that you have gotten their attention and are challenging them in a meaningful way. Be prepared to explain to students, as questions emerge, that your course is designed to teach them how to use their knowledge and think for themselves, which will prepare them for real-world success.

(Many instructors find that becoming aware of the "Scheme of Ethical and Intellectual Development" by William Perry is useful in understanding and responding to students who struggle at being challenged in new ways. Descriptions of the Perry Scheme can be found by Googling the term, or visiting Wikipedia.)

In any case, this will be a learning process for both you and your students. Students in general will be forgiving when they notice that you are trying to create for them an engaging experience, and that they are learning more than they would in a lecture-based course on the same content. We hear stories from faculty members who tell of how their students became partners in the process, offering feedback during the course on how to improve RATs as well as the design of 4-S activities that did not work as planned.

Your goal for a first time effort is to put the basic TBL protocols in place, work with the 5 pillars of practice, and fine tune as you go.

It's common for some instructors to struggle at first with designing consistently effective 4-S team application activities around meaningful choices and decisions that generate lively, relevant discussion. Good ones take time to develop. But don't worry: clunky activities can still be productive for students. You'll learn from observation what needs to be done to tweak an activity for the next time you offer the course. Keep good notes as you go to remind your future self of what needs to be changed.

For other instructors, calibration of optimal RAT difficulty is also something to be learned through practice. Start with a good mix of harder and easier questions, then adjust based on performance. ***Don't be surprised if many students crash on the first iRAT.*** Students often are unaware of their reading comprehension level. They will become more disciplined readers as the course progresses, and you will be able to increase the question difficulty as well.

Still other instructors will find facilitation of whole-class team reporting and discussion to be a new and difficult challenge. When students grapple authentically with a problem or an idea, our

initial enthusiasm to respond and engage with students can cause us to forget that we are managing a process for a classroom of students, not just having a conversation with one group or one individual. Over time, as you become more adept at anticipating where a good conversation can and should go, it will be easier to manage the process to keep the whole room engaged.

Above all, it's common for everyone to struggle a bit in adapting to a fully outcomes-driven course, where designing student team assignments forces you to "think backward" to make sure all the pieces are in real alignment, from the clarity of learning outcomes, to the design of 4-S application activities, to the creation of the RATs, to the selection of content.

There will be genuine joy in the effort, however. We are reminded of a colleague who recently commented to us during her first semester of TBL, "The discussions in class have been inspiring: this is the first time in my teaching career that I've actually been able to **see and hear** my students learning!"

These students could be yours. Trust the method.

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