

Emergence

Informally, emergence is the notion that something is more than the sum of the parts from which it is constructed. Some examples [1] help illustrate this:

- A molecule of water is not wet. Wetness is an emergent property of large numbers of water molecules.
- At the microscopic level the dynamical equations of physics are reversible. A particle can literally go back in time. Not so at the macroscopic level. Macroscopic irreversibility is an emergent property of large numbers of molecules.
- A single neuron is not conscious. Consciousness is an emergent property of large numbers of neurons firing inside a brain.

Likewise there is a significant difference between a group and a team: the team exhibits synergy. It clearly takes a transformation process to evolve a small group into a powerful, cohesive learning team. Michaelsen [2] outlines a set of principles and practices that are critical to this transformation process.

TBL: Four Key Principles

The power of team-based learning is derived from a single factor: the high level of cohesiveness that can be developed within student learning groups. TBL entails three important changes:

- Primary objectives shift from **knowing concepts** to **using concepts**.
- Teacher shift from expert (sage on the stage) to moderator (guide on the side). Instead of just being someone who dispenses information and concepts, the **teacher will need to design and manage** the overall instructional process.
- Students shift from **passive learners** with limited responsibility for their learning to **active learners** with an increased responsibility for their learning.

Changes of this magnitude do not just happen automatically. They happen when the teacher is able to implement the four essential principles of team-based learning. The essential principles are:

1. groups must be **properly formed and managed**,
2. **students must be made accountable** for their individual and group work,
3. group assignments must **promote both learning and team development**, and
4. students must have **frequent and timely feedback**.

When these principles ([7] below) are in place, groups of students evolve into cohesive learning teams.

Four Key Principles for Success

Team Formation

Teams must be properly formed and managed

- Create teams with diverse skills and abilities
- Make teams fairly large (5 to 7 members)
- Make teams that are permanent

Timely Feedback

Frequent and timely performance feedback is important.

- RAP informs individuals and teams on the quality of their pre-class preparation.
- Intra- and inter-team discussions provide for feedback.
- Peer review provides feedback on contribution to team performance

Accountability

Students must be made accountable for:

- Individual pre-class preparation
- Contributions to team activities and assignments
- Contributions to team functioning

Create a grading and peer evaluation system for accountability.

Assignment Quality

Designed to promote learning and team development.

- Effective assignments should be based on decisions that can be reported in simple form.
- "Team problems" are often the result of assignments that do not require group interaction.

Instead of following [2] with a general discussion of these principles we will switch our attention to [3], a collection of short videos (between 1 and 7 minutes long) that discuss and illustrate the above.

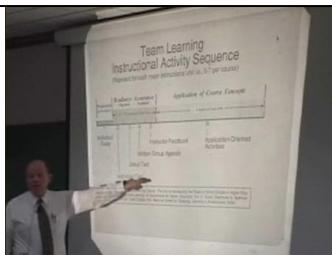
TBL Videos

Introduction to TBL



TBL is a very powerful and unique way of using learning groups. We started using TBL in the late 70s and we used it in a wide variety of course settings, wide variety of class sizes. We created these videos as a way of enhancing what you will find in the book [4] to give you a chance to see actual key elements of TBL in action. You will see videoclips from two different classes: one of them a large undergraduate class **in this room**¹ of about 120 students. The other an evening weekly graduate class of 43. [5]

Student Introduction to TBL

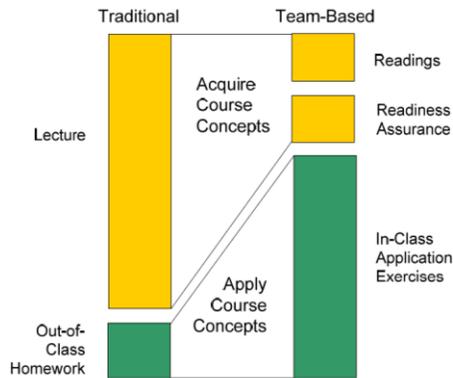


One of the [important] things about making TBL work is to ensure that students understand that it is really different than anything they ever experienced and [for them] to understand **why** it is that you're doing it and **what it means** to them. So in the first night, in fact the very first activity I go over a series of transparencies that identify my objectives and how I intend to meet them with team learning as compared to what would happen in a traditional course [6]. The slide seen in the snapshot appears below, along with a few other slides discussed in the video. He says that the traditional lecture style is not wrong, but shouldn't be abused. A well-designed lecture can be very enjoyable, but like a movie can only inspire, not teach. Teaching entails learning which can only happen within an individual. Without learning there can be no teaching and too much lecturing stays in the way of learning. Plus it doesn't do anything in the way of developing students' interpersonal and team interaction skills.

¹ Recall the questions we had about logistics. Does the room in the picture look like the classroom of the future?

Course Objectives

- Ensure that students master the course subject matter.
- Develop students' ability to use course concepts in thinking & problem solving
- Prepare students to be life-long learners
- Develop students' interpersonal & team interaction skills
- Have students' enjoy the course



See [2] for the above.,

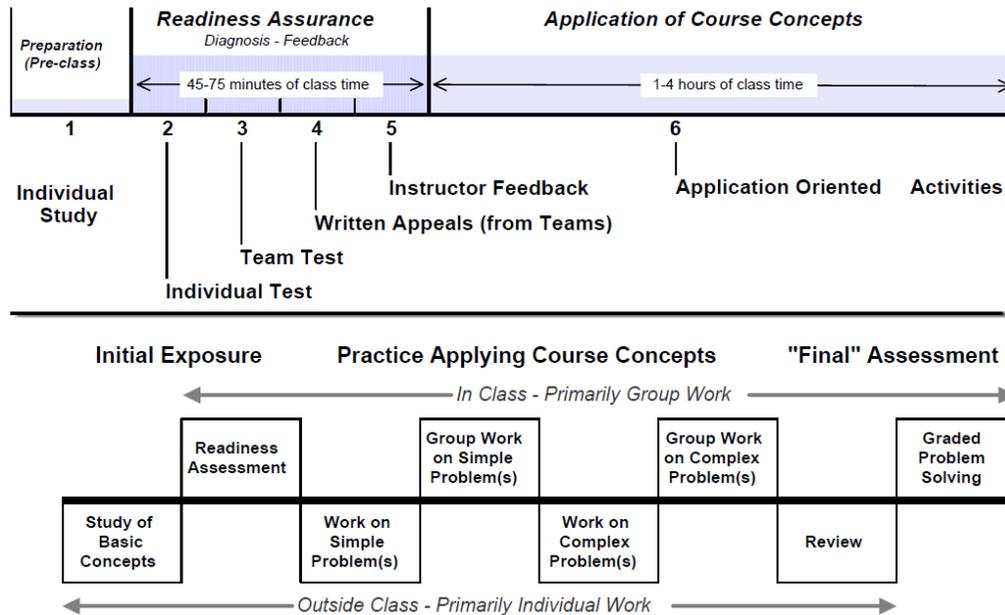
Learning Objectives and Instructional Strategies

Learning Objectives	How Objectives Accomplished with: Traditional Teaching	Team-Based Learning
Ensure students' mastery of course subject matter	<ul style="list-style-type: none"> •Lecture •Class Discussion •Individual Study (post-class?) 	<ul style="list-style-type: none"> •Pre-class individual study •Readiness Assurance Process
Develop students' ability to use course concepts in thinking & problem-solving	<ul style="list-style-type: none"> •Class discussion •Individual exams/projects •Group presentations and/or papers, etc. (outside-class) 	<ul style="list-style-type: none"> •In-class group/team work (problem-based discussion within, then between groups) •Individual exams/projects
Enhance students' interpersonal and team interaction skills	<ul style="list-style-type: none"> •"Sink or swim" (Since group work is outside class, instructors CAN'T help students learn from their experience working in a group.) 	<ul style="list-style-type: none"> •In-class group/team work (Tasks require cooperation; provide feedback on and rewards for both individual and group performance.)
Prepare students to be lifelong learners	<ul style="list-style-type: none"> •Little or nothing (Mostly counterproductive because passive role reinforces student dependency.) 	<ul style="list-style-type: none"> •Active learning (Exposes students to multiple learning strategies; learners become confident & resourceful.)
Enjoy course!	<ul style="list-style-type: none"> •Content well organized •Instructor delivers content with enthusiasm and 'style' •Lectures supported by high-quality visuals, etc. 	<ul style="list-style-type: none"> •Team assignments that are interesting, relevant and challenging •Immediate feedback •Friendship/social support

[8]

Team-Based Learning Instructional Activity Sequence

(Repeated for each major instructional unit, i.e., 5-7 per course)



See [7]

Establishing a Climate of Open Dialogue



Once students understand what TBL is and how it will work it's critical to establish an open atmosphere so that they're willing to speak to me and to each other. So I pair them up with someone who they don't know and ask each pair to identify a question they'd like to ask me [9]. Answering a question on students not being able to come to class (and thus take part in the associated teamwork): [...] in the night classes when folks have to be gone often, well, I do let you make up the individual [test] but you have to live with the consequences of not being able to help the group. It's kind of like the workplace – if you're gone the people you left behind have to do the work. And if you continue to be gone and they have to do the work they don't like it very much. But if you got a good reason: that's OK. And you live with the score that they get... A lot of folks will make arrangements to take it in advance, and if you do that, I'll give your answers to the group and any explanations you want to write so they have that when you're gone. But we have to arrange it on an one-to-one basis and hopefully not for very many of you.

Forming Groups



Before you can get to the TBL and make it work you have to actually establish the teams and that's one of the critical pieces. It involves assigning the set of people in the class to groups in a way so they have the resources to do what they need to do. You have to do it on the spot, with very little information about them, but the objective is to create groups that are heterogenous that have the assets and liabilities in relation to this course mixed up equally across the groups. The other thing is that groups have to be big enough so they have in combination a set of assets that allows them to be effective. Now what you'll see is a very simple process where I gather some information about them that I think it's important in relation to this course, and I simply have them form a line and count them into teams [10]

Four Questions for Designing Learning Activities



With Team-Based Learning for any unit of instruction I suggest that people ask four questions. They are: 1. What do I want students to be able to do at the conclusion of this unit of instruction (this defines the outcome in behavioral terms)? 2. What do they have to know to do it (that is the content we need to cover)? 3. How am I going to know how much they know already (that determines the questions I will need to ask in the RAT)? 4. How do I know that they have learned it (I'll have you do an activity that proves you can do it)? Well, I've asked those questions for this first night of class... [11].

Giving a Practice Readiness Assessment Test



Shows how to administer a first Readiness Assessment Test (RAT) in order to give them a direct experience of how content is covered in Team-Based Learning. So, what I have them do is to give them a very short reading assignment: the syllabus of the course. And what I want them to do is to get from the



syllabus the things that they need to know about the course and test whether or not they got them before they set the grade weights or they leave to read the material for the next class period. [12].

Setting Grade Weights



The next things that you'll see is the setting of grade weights. And the reason I like this is because even though you tell your students that things will be different – they don't believe you. But once you let them create the grading system through which we grade them – and it's clear that they are doing it, it's not me -- it really sinks in. Noone ever questions it, and it's clear that they understand it, because they created it, and they also buy in – because they created it. [13].

Using the Readiness Assurance Process (RAP/RAT) in Two Different Situations



First off the images are from the room that shows up in the first video (the other room was not raising questions). One of the most obvious differences between team-based learning and other approaches to teaching is that students take on a major part for the responsibility for covering the basic content.



But that doesn't happen automatically; you have to do something. And in this case what's done is that you hold them accountable by using the Readiness Assurance Process (RAP) ... and not only accountable but you create conditions to make sure that it does happen. It involves a series of activities that start with an individual test. They turn in an answer sheet and then you give them an answer sheet for the team. The team retakes this test (as a team). They get immediate feedback on them (when they take the test as a team, through the use of IF-AT sheets) and then they get a chance to do appeals for those questions that they haven't gotten full credit on – and when they do that, it becomes open book, so that takes them back into the material at the exact point of their misunderstanding. Then finally, I get a chance to say the things that I want to say based on my listening of what's going on (JITT – just in time teaching) and also be able to respond to their questions. So I don't have to say very much and what I do say is what they don't know, and the consequence is that they're very interested in what I have to say (and part of the reason is that I don't say too much, so it's short). The video shows several different examples of this Readiness Assessment Process/Test in those two classes. Note that lack of immediate feedback inhibits learning. IF-AT forms are shown. With these forms students try their hardest to get the answers right (during the Team RAT) from the first attempt. This helps learning, team development. [14]

Running Application Exercises in Large Classes



One of the key features of TBL (Team-Based Learning) is that it provides students with an opportunity to interact on their own directly with the material or use the material & make meaningful decisions – probably the biggest benefit and the most challenging aspect of it. There is a lot of information in the book, and



on the website, from a variety of courses. In the video you will see how engaged they were (both with me and the others in the class). In the video I used an answer finder (ping-pong ball, tub, etc.) [15, 19].

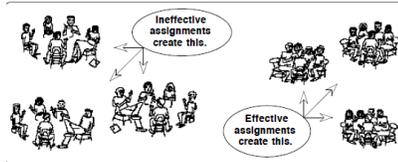
Running Application Exercises in Large Classes (cont'd)



Designing Effective Group Activities: Lessons for Classroom Teaching and Faculty Development

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Designing Effective Group Activities: Lessons for Classroom Teaching and Faculty Development

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Abstract: The primary objective of this article is to provide readers with guidance for designing effective group assignments and activities for classes and workshops. In doing so, we examine the forces that foster social loafing (unseen participation) in learning groups and identify four key variables that must be managed in order to create a group environment that is conducive for broad-based member participation and learning. We then discuss the impact of various types of activities and assignments on learning and group cohesiveness. Finally, we present a checklist that has been designed to evaluate the effectiveness of group assignments in a wide variety of instructional settings and subject areas.

Over the last few years group activities have become increasingly popular. However, instructors and workshop leaders frequently report three common problems that greatly reduce the effectiveness of small-group based learning activities. Two of the three problems typically occur while students or workshop participants are actually engaged in the group work. Probably the most common problem is that one or two vocal individuals often dominate the discussions to the point that quieter members' ideas are either unexpressed or largely ignored. Alternatively, groups frequently have difficulty staying focused on the assigned task because they get side-tracked on inconsequential or irrelevant details. The third problem occurs when groups are reporting the results of their work to the total class. Even when there has been a high level of engagement in the small groups subsequent whole-class discussions sometimes "fall flat."

Based on our experience, these "problems" are actually symptoms that are almost always the result of poorly conceived group tasks. Further, we believe that all three of these problems can be avoided if classroom teachers and faculty developers use activities that are designed to take into account: 1) the developmental level of the groups in which they will be used and, 2) the impact of the activity on the cohesiveness of the groups.

With this in mind, our primary objective in writing this article is to provide a set of conceptual tools to provide guidance for designing effective group assignments and activities for classes and workshops. Overall, the most important idea in the paper is that the most reliable way to gauge the learning value of group assignments is to examine their impact on group cohesiveness.



Assessing Course and Team Effectiveness at Mid-Term (Formative Evaluations)



The segment you see next comes about a third of the way in the course and what I like to do is give students a chance to reflect on what's going on in the course, going on in the teams, as a way of providing feedback to me and input for the remaining of the course [16]. It involves some sheets and these are also on the website so you should download them to see them. The sheets first ask individual students questions about the class and the group (what they like about it and what they think the group can and should do in order to improve). You need to share the results with them. On the tape you will see me relaying this information to them after it's been collected and summarized. Open transparent climate.

The Differences between Groups and Teams



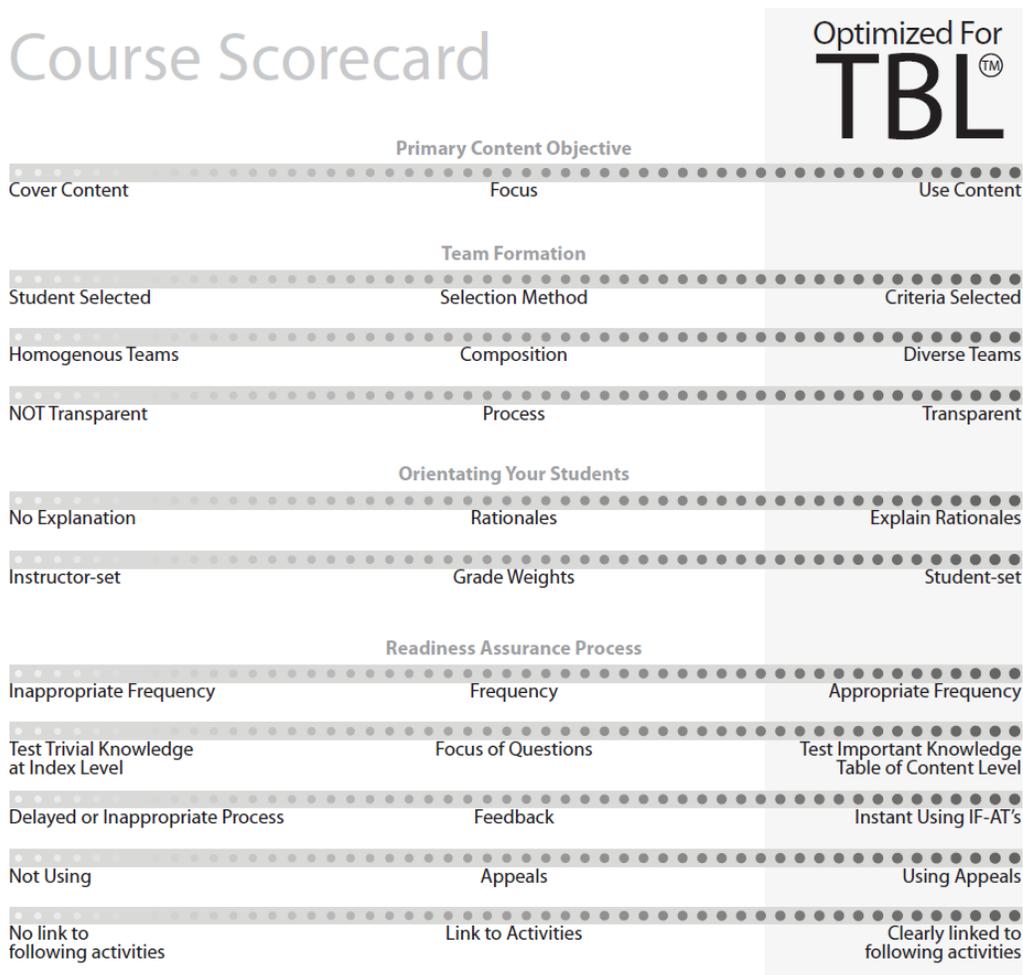
One of the magic things that happens with TBL is that you end up with teams. They don't start out that way and what we want to show you in this video is the evolution of groups into teams. You will see them in the beginning when they are not teams then later. Initially they manage their space poorly, avoid challenging each other. Later on they care more about being right than being polite, and being face to face. Many examples are discussed and you learn to assess cohesion in groups in this video. [17].

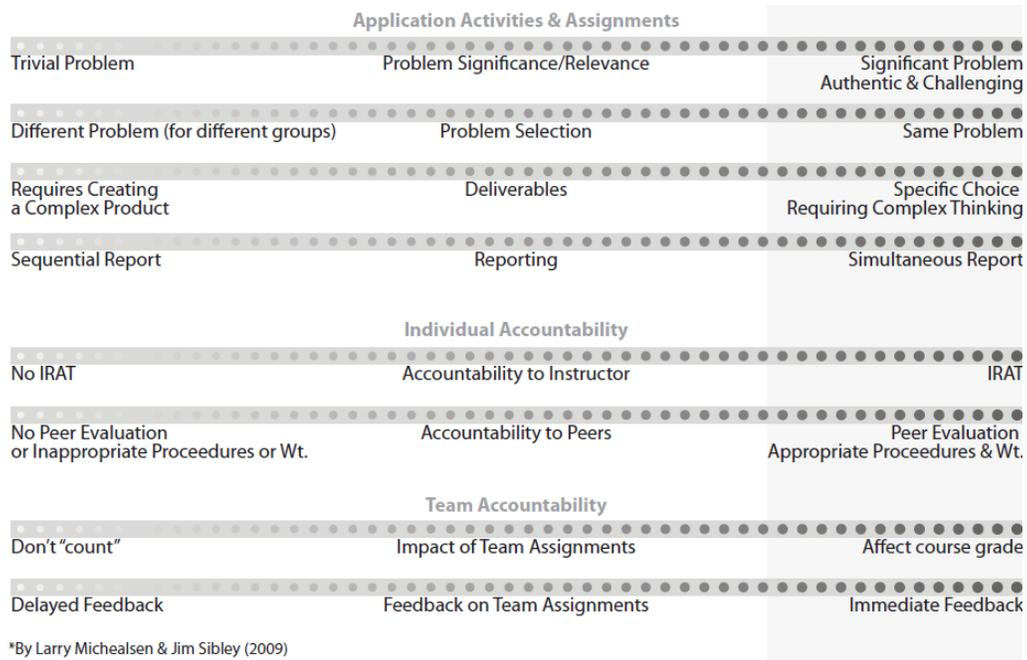
Who Drops a Course and Why?

Should *not doing well in a course*, by itself, be regarded as a *legitimate reason for dropping a course*? Regardless of how you answer that question you know that a student drops a class in which (s)he feels isolated, is not doing well or doesn't have the perception that (s)he might ever do well. Hardly anyone ever drops a class because of classmates. The material, the grades and lack of effective interaction with the instructor(s) or anyone that knows the material for that matter are the three most important reasons for dropping a class. TBL provides the level of support that helps students control and ultimately overcome problems related to these three factors, thus students can persist in their educational quest.

Caveat Emptor

Probably the worst that can happen is to get excited, get started with insufficient planning and have a bad experience, then never again try TBL. To protect the scientific integrity of the method its custodians have trademarked it. Here's the least you need to be aware of : the TBL Scorecard [18].





Questions

The only question I had was: are we (Division U) a team or a group? Should we be a team or a group?

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