



Northeastern University
*Center for Advancing Teaching and Learning
Through Research*

Team-Based Learning: Group Work that Works

Michael Sweet, Ph.D.

Director of Design and Integration

Center for Advancing Teaching and Learning through Research

Team-Based Learning (TBL)



- A “flipped-classroom” instructional strategy.
- A collection of interlocking techniques.
- A set of principles, not a cookbook.
- A “motivational exoskeleton” to hang over much of what you already do.
- An evidence-based practice used by thousands of college teachers in all disciplines.

Individual Readiness Assurance Test (iRAT)



For each question, you have 3 points to distribute across possible answers.

- If you are sure the answer is A, put all 3 points on A.
- If you are fairly confident it's A but are also leaning towards C, then put 2 points on A and 1 point on C, etc..

For Example:

Question	A	B	C	D	E
1	<i>3</i>				
2	<i>2</i>		<i>1</i>		

Team Readiness Assurance Test (iRAT)



Now as a team, take the same test again, coming to consensus on your team answers before you scratch.

- If you find the star on the first scratch, your team gets all 3 points.
- If it takes you two scratches, you get 2 points.
- If it takes you three scratches, you get point.

Bring me your card when you're done. 😊

IMMEDIATE FEEDBACK ASSESSMENT TECHNIQUE (IF AT®)					
Name <u>Team #3</u>			Test # <u>2</u>		
Subject _____			Total _____		
SCRATCH OFF COVERING TO EXPOSE ANSWER					
	A	B	C	D	Score
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	3
2.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2
3.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3
4.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

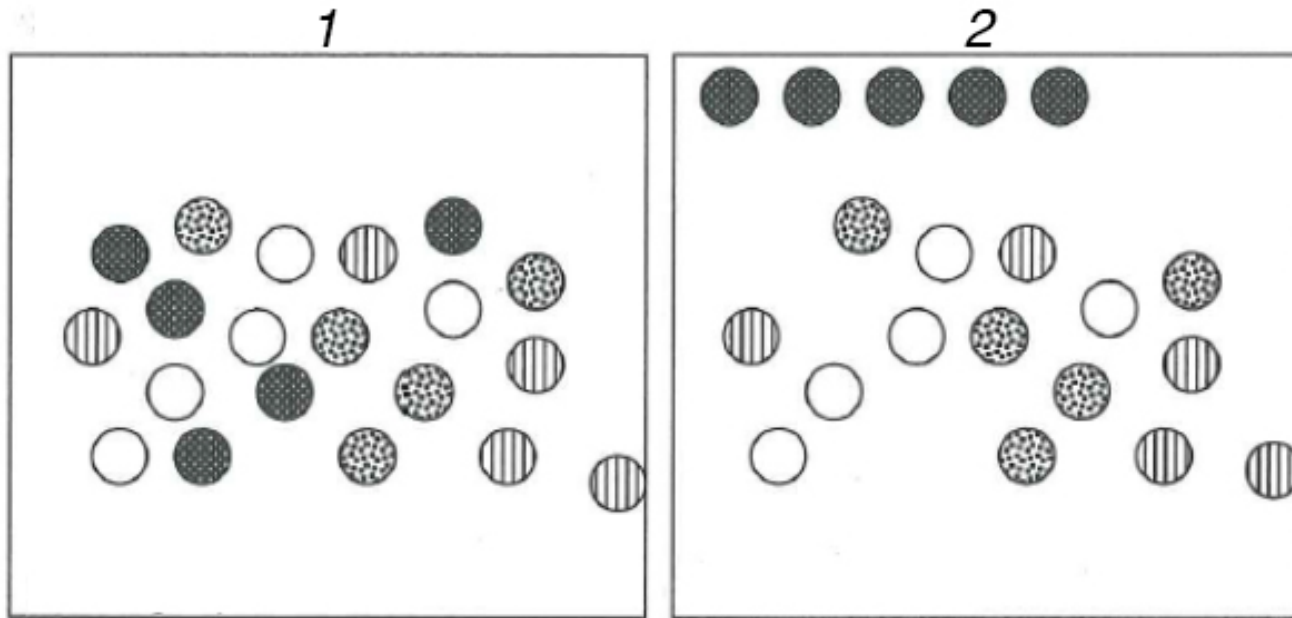
Team	1	2	3	4	5
Score					
Team	6	7	8	9	10
Score					
Team	11	12	13	14	15
Score					
Team	16	17	18	19	20
Score					

Four Pillars of Team-Based Learning

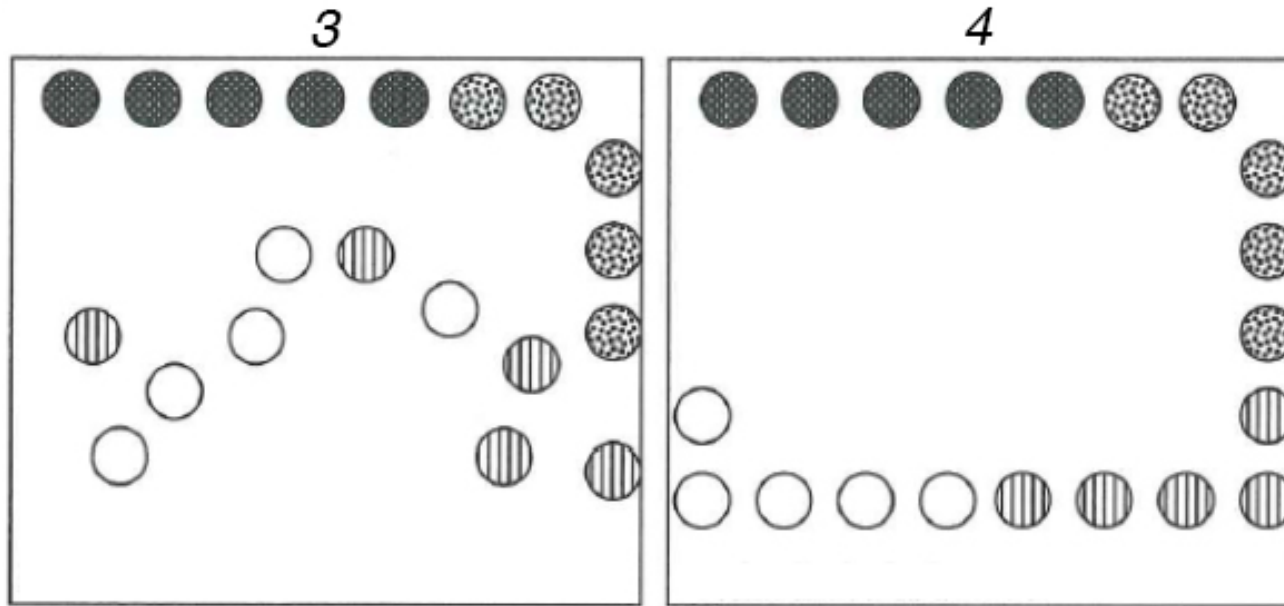


1. Strategically-formed, permanent teams
2. Readiness assurance
3. 4-S Application activities
4. Peer evaluations of teamwork

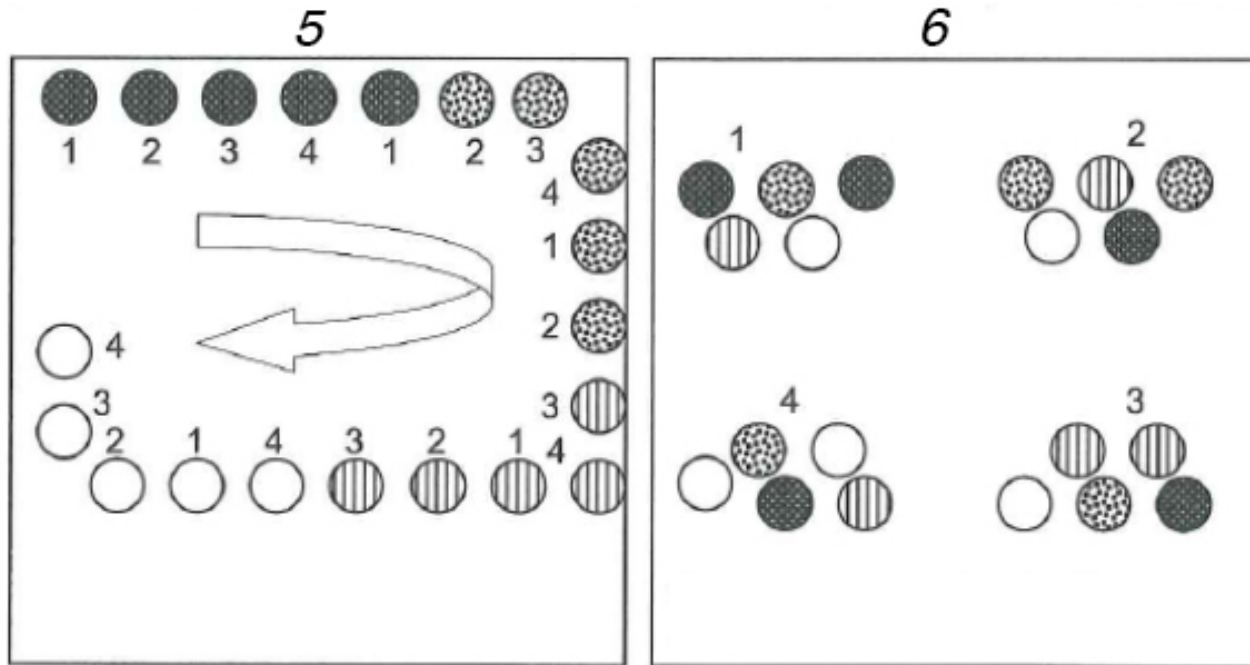
Group Formation Process



Group Formation Process



Group Formation Process



Timeline of a TBL Unit



Team-Based Learning Sequence

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

Preparation
(pre-class)

Readiness Assurance

45-75 minutes of class time

Application of Course Concepts

1-4 hours of class time

Individual
Study

Individual Test

Team Test

Written Appeals (from teams)

Clarifying Lecture

Application Activities



1. Significant problem
2. Same problem
3. Specific choice
4. Simultaneous report

4-S Activity Formats

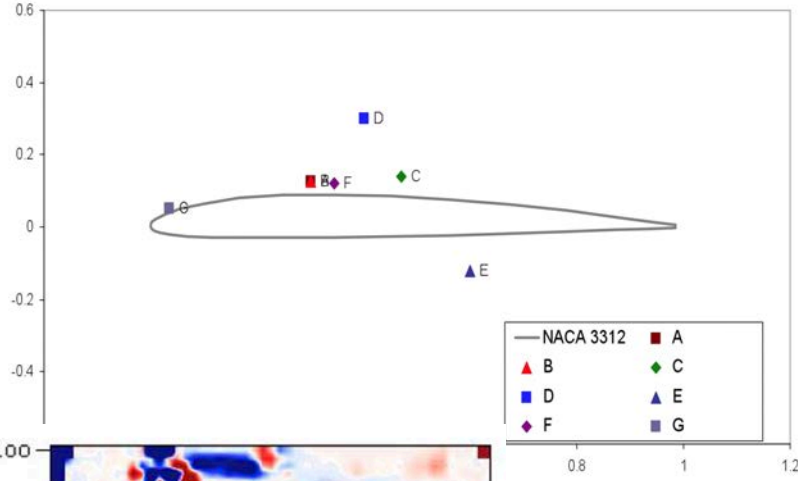


Scenario/MCQ format is the most common and scalable

Other formats:

- “Pinpointing”
- Sorting
- Gallery walk

“Pinpointing” - Choosing a Location



Jane Smith
 Address Line 1, Address Line 2, City, State Zip • (212) 256-1014 • jane.smith@gmail.com

CAREER OBJECTIVE
 Administrative Assistant with 6+ years of experience working directly for the President of 3M Inc., a Fortune 500 company. Possesses impeccable written and verbal communication skills and excellent interpersonal skills.

CORE COMPETENCIES

- Customer Service
- Cost Efficient
- Detailed and Organized
- Supplier Relationship

PROFESSIONAL EXPERIENCE

3M INC., New York, NY
Administrative Assistant, Apr 2006 – present

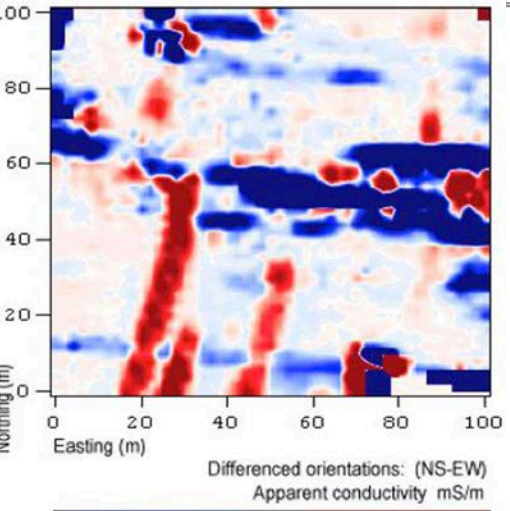
- Read and analyze incoming memos, submissions, and reports to determine their significance and plan their distribution.
- Conduct research, compile data, and prepare papers for consideration and presentation by executives, committees and boards of directors.
- Coordinate and direct office services, such as records, departmental finances, budget preparation, personnel issues, and housekeeping, to aid executives.
- Prepare invoices, reports, memos, letters, financial statements and other documents, using word processing, spreadsheet, database, or presentation software.

FLORIDA DEPARTMENT OF SOCIAL SERVICES, Orlando, FL
Rehabilitation Counselor, Aug 2004 – May 2006

- Confer with clients to discuss their options and goals so that rehabilitation programs and plans for accessing needed services can be developed.
- Prepare and maintain records and case files, including documentation such as clients' personal and eligibility information, services provided, narratives of client contacts, and relevant correspondence.
- Develop and maintain relationships with community referral sources, such as schools and community groups.
- Analyze information from interviews, educational and medical records, consultation with other professionals, and diagnostic evaluations to assess clients' abilities, needs, and eligibility for services.

EDUCATION

FLORIDA STATE UNIVERSITY, Orlando, FL
Bachelor of Art in English, May 2004
 GPA: 3.149



```

public void CreateNESInvoice()
{
    DateTime dtCurrent = DateTime.Now;
    DateTime dtStartOfMonth = new DateTime(dtCurrent.Year, dtCurrent.Month, dtCurrent.Day);
    DateTime dtEndOfMonth = dtStartOfMonth.AddMonths(1).AddDays(-1);

    Invoice invoice = new Invoice();
    invoice.UBLVersionID.Value = "2.0"; // 1..1
    invoice.ProfileID.Value = "urn:www.nesubl.eu:profiles:profile4.0"; //
    invoice.ID.Value = "1000234"; // 1..1
    invoice.IssueDate = dtCurrent; // 1..1

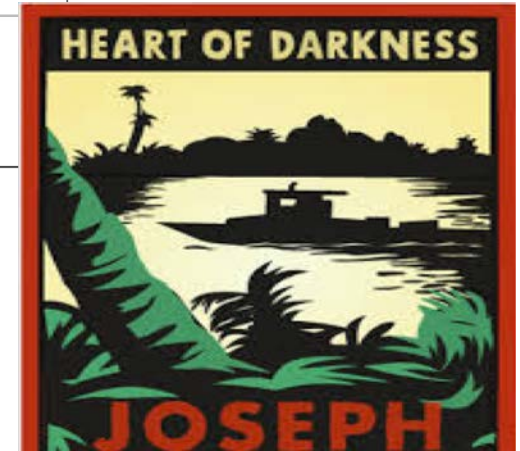
    Text note = new Text();
    note.Value = "Please take care of the invoice before the due date.";
    note.LanguageID = "ENU";
    invoice.AddNote(note); // 0..1

    // set the invoice period
    Period invoicePeriod = new Period();
    invoicePeriod.StartDate = dtStartOfMonth; // 0..1
    invoicePeriod.EndDate = dtEndOfMonth; // 0..1
    invoice.AddInvoicePeriod(invoicePeriod); // 0..1

    // accounting supplier party
    SupplierParty supplierParty = new SupplierParty();
    supplierParty.Party.WebsiteURI.Value = "http://www.supplierparty.com";
    supplierParty.Party.EndpointID.Value = "ENDP1234"; // 0..1

    // set up an invoice line
    InvoiceLine invoiceLine = new InvoiceLine();
    invoiceLine.LineExtensionAmount.Value = 999.50M;
    invoiceLine.LineExtensionAmount.CurrencyID = "EUR";
    }
    
```

through 3M Inc.



Sorting



1. Recall stylistic features of La Tene/Celtic (c.450 BC–c.100AD) artwork and Scandinavian/Viking (c.800AD–c.1200AD) artwork
2. Compare and differentiate artifacts by style and age



Sorting



La Tene / Celtic (c. 450 BC – c. 100AD)	Scandinavian / Viking (c. 800AD – c. 1200AD)
<p data-bbox="465 334 838 358">La Tene Mirror, c.100BC, England</p> 	<p data-bbox="1064 334 1464 358">Mammen Button, c.900AD, Denmark</p> 
<p data-bbox="446 635 857 659">La Tene Torc, c.250-c.50BC, England</p> 	<p data-bbox="1074 635 1445 659">Mammen Axe, c.900AD, Denmark</p> 
<p data-bbox="426 912 877 936">La Tene bronze flagon, c. 450BC, France</p> 	<p data-bbox="1045 912 1483 936">Jelling Style chalice, c.900AD, Denmark</p> 

Gallery Walk



Microbiology: Michael McInerney
University of Oklahoma

Content	All relevant concepts are included and are correct	Most relevant concepts and mechanisms are included and are correct	Few relevant concepts and mechanisms are included and are correct
Points	6 5	4 3	2 1
Logic and Understanding	Understanding of facts and concepts is clearly demonstrated by correct links and active verbs	Understanding of facts and concepts is demonstrated but with some incorrect links and/or some missing active verbs	Poor understanding of facts and concepts with significant errors in links and active verbs
Points	6 5	4 3	2 1
Presentation	Concept map is neat, clear, legible has easy-to-follow links and no spelling errors	Concept map is neat, legible but with some links difficult to follow or some spelling errors	Concept map is untidy with links difficult to follow and spelling errors.
Points	3	2	1

Peer Evaluations



Team Reflection and Feedback Team# _____ Name _____

To help your team become more effective, give your team-mates some anonymous feedback.

Consider such things as:

- *Preparation*: were they prepared when they came to class?
- *Contribution*: did they contribute to the team discussion and work?
- *Gatekeeping*: did they help others contribute?
- *Flexibility*: did they listen when disagreements occurred?

You have **25** points to distribute among your team-mates. These are anonymous, so be honest. :-)

<http://teammatesv4.appspot.com/>

1. Team Member Name:	Points
Things I appreciate about this team member:	
Things I would like to request of this team member:	

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- Confidential peer evaluations
- Anonymous peer feedback
- Shareable instructor comments
- Searchable student records

1,361,248 feedback entries submitted so far ... [Video Tour](#) [Request a FREE Instructor Account](#)

Received Responses Statistics

... distribute 30 points among yourself AND your teammates. [more]

Team	Points Received	Average Points
Team 3	5, 5, 5, 6, 6, 6	5.5
Team 3	5, 5, 5, 6, 6, 6	5.5
Team 3	5, 5, 5, 5, 5, 7	5.33
Team 3	4, 5, 5, 5, 5, 7	5.17
Team 3	2, 3, 4, 4, 5, 5	3.83
Team 3	3, 4, 5, 5, 5, 6	4.67

Team 3 Detailed Responses [Expand Students](#)

“Group Projects” – Production, not learning

	Weeks 2-3	Weeks 4-5	Weeks 6-7	Weeks 8-9
Student A	Project Mgr.	Role 4	Role 3	Role 2
Student B	Role 2	Project Mgr.	Role 4	Role 3
Student C	Role 3	Role 2	Project Mgr.	Role 4
Student D	Role 4	Role 3	Role 2	Project Mgr.

- Milestone Deliverables
- Peer evaluations

- Arguably equitable experience across the semester
- Project must be “chunkable”
- Requires same number of roles, phases, and students per team
- Recommend having one role be **Project Manager**



GROUP WORK THAT WORKS

Team-Based Learning is a “flipped classroom” form of collaborative learning that consists of four practical elements:

1. strategically-formed, permanent teams;
2. readiness assurance activities at the beginning of each unit to motivate, engage, and clarify;
3. application activities in which teams must make discipline-based decisions;
4. student peer evaluations to motivate accountability and high-performance team-work.

TIPS

Strategically-formed, permanent teams maximize the benefits of diversity and team development: student characteristics that make the course easier or more difficult are spread as evenly as possible across teams that last the entire term, giving them the chance to develop into high-performance learning teams.

Readiness assurance activities consist of a four-step process that takes place at the beginning of each course unit:

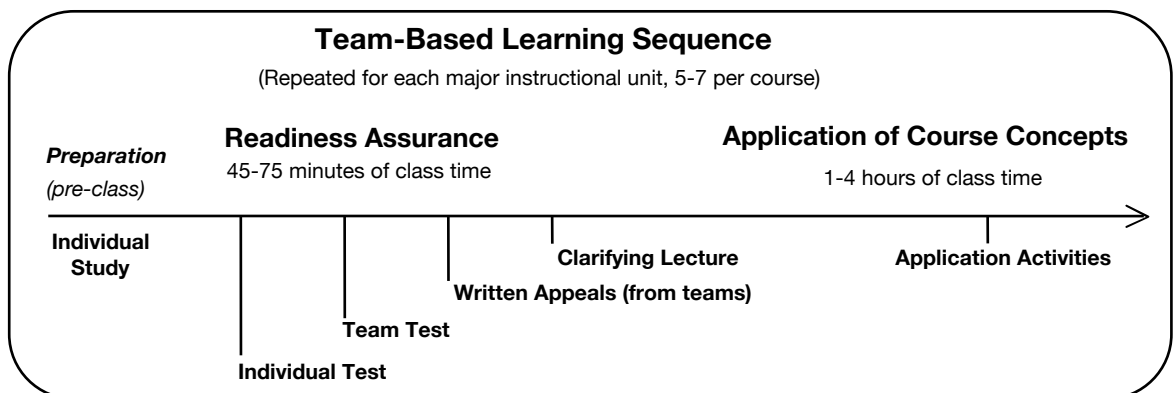
- Preparation by students outside of class – selected readings, videos, podcasts, and so on.
- Individual readiness assurance test (iRAT) – short, basic, multiple-choice test over preparation materials
- Team readiness assurance test (tRAT) – once they turn in their individual tests, students then take the exact same test again, and must come to consensus on their team answers. Teams must get immediate feedback on their performance, currently best achieved using "scratch off" forms called IF-ATs. Students teach each other a tremendous amount in this phase.
- Appeals – When teams feel they can still make a case for their answers which were marked as incorrect, they can pull out their course materials and generate written appeals, which must consist of (a) a clear statement of argument, and (b) evidence cited from the preparation materials.

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Name <u>Team #3</u>			Test # <u>2</u>		
Subject _____			Total _____		
SCRATCH OFF COVERING TO EXPOSE ANSWER					
	A	B	C	D	Score
1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	4
2.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2
3.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4
4.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1
5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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Team-Based Learning Sequence

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



“Group projects” can have a structural flaw – Assignments like papers and presentations require a group to produce a complex product. The most rational approach to this task is to segment and distribute the work among group members. This divergent task too-often results in an inequitable and low-quality experience. A better task structure for a learning group is a convergent task, similar to that of a courtroom jury: given a tremendous amount of complex information, they must produce a choice, and perhaps a very short rationale.

For example:

- Given a set of financial data, should the company buy, lease, or rent their trucks?
- Given an article, which paragraph would Marx find most disagreeable?
- Give a collection of pictures, which are normal vs. abnormally-developed infants?
- Which moment in a given film is the best example of family system dynamics?
- What’s the best rank-order of pieces of evidence—from strongest to weakest?



Student peer evaluation: both mid-course and end-of-course team-mate feedback is processed through the instructor and returned to the students with names removed. In many cases, this takes the form of students listing for each of their team-mates one thing they Appreciate about that team-mate and one thing they Request. Must contribute to student grade. A free, online system called TEAMMATES (<http://teammatesv4.appspot.com>) now makes this very fast.

THE RESEARCH

A meta-analysis of 38 quantitative studies found that TBL produced learning outcomes nearly half a standard deviation higher than comparison teaching approaches (Liu & Beaujean, 2017). Further, Comeford (2016) incorporated TBL into a first-semester general chemistry course and reduced attrition from 31% to 19%.

These additional findings were assembled by Sisk (2011):

1. **High student satisfaction** is reported in introductory medical courses (Abdelkhalek, Hussein, Gibbs & Handy, 2010), second year medical courses (Parmelee, DeStephen & Borges, 2009), economics courses (Espey, 2010) and psychotherapy courses (Touchet and Coon, 2005). Sisk notes that the highest academic achievers seemed to be less positive about TBL.
2. **High student engagement** is reported in medical courses (Kelly, et al, 2005), clinical nursing courses (Feingold, et al. 2008), and case management courses (Clark, et al. 2008). Sisk notes that this higher level of engagement is to be expected because students in TBL courses are required to work together as student engagement is part of the process of delivering instruction.
3. **Higher examination scores** are reported in microbiology courses (McInerney and Fink, 2003), organizational/industrial psychology courses (Haberyan 2007), medical elective courses (Wiener, Plass and Marz, 2009), and medical pathology courses (Koles, et al., 2010). Sisk notes that many exam-score studies are pre-TBL/post-TBL comparisons without simultaneous control groups.



EFFECTIVE GROUP DISCUSSION ACTIVITY DESIGN

Effective group discussion activities do not require groups to produce a complex product like authoring a paper or making a presentation. Writing and presenting are inherently individual tasks—when groups are assigned these tasks, they divide-and-conquer, focusing on production and not discussion. In contrast, effective group discussion activities give groups a curated collection of information and require them to make a difficult disciplinary decision, like a courtroom jury is given a great deal of complex information and asked to render a "guilty or not guilty" decision.

MAKE-A-SPECIFIC CHOICE ACTIVITIES

Effective group discussion activities take the form: “**Given X, groups must decide Y.**” Of course, X and Y will vary based upon your learning goals for the activity, but a few basic principles can help you design powerfully-effective learning activities in any discipline. Each of these principles starts with the letter S, so they have come to be called “4-S activities.” 4-S activities revolve around the four following principles:

1. **Significant problem**

Students should work on a problem, case, or question demonstrating a concept's usefulness so they understand its impact. These are application problems. Instead of asking students to discuss some abstract set of conceptual distinctions, embed those distinctions within a set of concrete circumstances. This is how you position students as “cognitive apprentices” in your discipline—forcing them to start making the choices that people in your discipline make.

2. **Specific choice**

The activity must require groups to use course concepts to come to consensus and make a decision. Examples could include: Should the company buy, lease, or rent their trucks? Which essay is the best example of historicism? What's the most vulnerable part of this design? Which of the following statements would an author most strongly disagree with?. Groups can be required to generate short, written rationales for their choice but groups must first be required to take a position.

3. **Same problem**

Groups should all work on the same problem, case, or question so they will care about what other groups think about it and engage each other around the course content. This creates conditions for fruitful inter-group discussion.

4. **Simultaneous reporting**

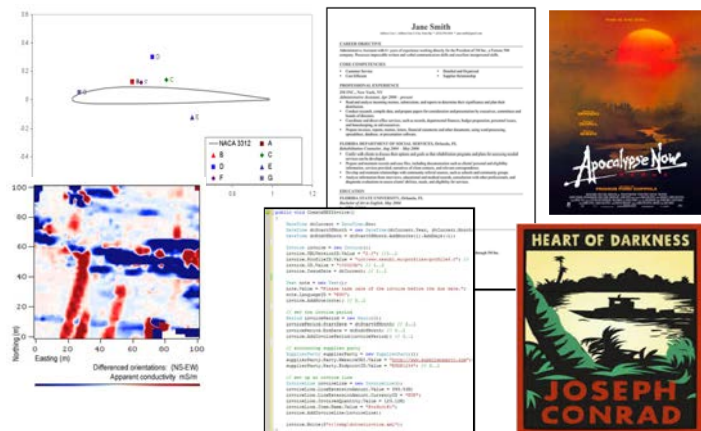
If possible, groups should report choices at the same time so differences among group conclusions can be explored and are not smoothed out by "answer drift" in which a few of the same (potentially incorrect) answers delivered *first* wind up swaying the whole room. It can be a powerful instructional experience when a minority of students in the room actually come to a better answer than the rest.

SOME 4-S ACTIVITY TEMPLATES

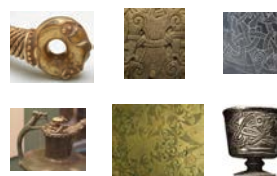
Scenario + Multiple-Choice Question is a common format to get discussions moving with energy. For example, “You are a paramedic at the scene of an accident where a 37 year old woman has some specific damage to her abdomen: do you put her in the ambulance (a) on her back, (b) on her side, or (c) sitting up?” After a fruitful discussion, you can layer the scenario with new information: “Now she’s six months pregnant—does that change your answer?”



Pinpointing involves presenting groups a some complex “text”—e.g., an image, graph, resume, computer code, book or film—the possibilities are limitless. Then groups must come to consensus on a specific point within that text as the very best example of something. At which point around an airfoil are certain forces maximized? What’s the most likely site for infection? What piece of the resume or code is the weakest? What moment in the book or film is the best example of “magic realism”?

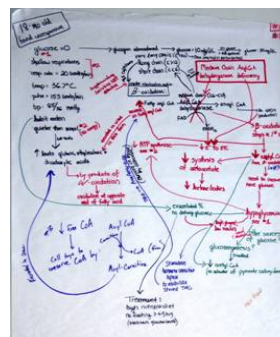


Sorting requires many specific decisions by requiring groups to come to consensus on categories, sequence, or priorities. For example, groups might receive pictures of Celtic and Viking artifacts, and have to sort them into categories by culture, and sequence by age. A nursing class might get pictures of normal and abnormally developed infants across several ages.



La Tène / Celtic (c. 450 BC – c. 100AD)	Scandinavian / Viking (c. 800AD – c. 1200AD)
La Tène Minor, c. 100BC, England	Mammen Button, c. 900AD, Denmark
La Tène Torc, c. 250-c.50BC, England	Mammen Axe, c. 900AD, Denmark
La Tène bronze fagon, c. 450BC, France	Jelling Style chalice, c. 900AD, Denmark

Gallery Walks are a two-stage activity: groups first produce something poster-like in response to a prompt. In this example, Thompson, LeClair, Wintersen and Manyan (2010) students’ graphed the primary and secondary biochemical effects in an 18 month old infant with medium chain acyl CoA dehydrogenase deficiency. In the second stage of the Gallery Walk activity, groups make specific decisions



about the work of other groups, often in the form of placing post-its on other teams’ posters in specific places. This is the group consensus activity. For example: what piece of another other teams’ work is the strongest or the most questionable?

Thompson, K.H., LeClair, R.J., Wintersen, B.J. & Manyan, D.R. (2010, July) *Concept Mapping as a Team-Based Learning Application Exercise in a First Year Medical Biochemistry Course*. Poster presented at the annual meeting of the International Association of Medical Science Educators, New Orleans, LA.