Team-Based Learning: A Strategy for Transforming Teaching and Learning in PA Education

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Goals for Today

Discuss principles related to maximizing the effectiveness of active learning in small groups

Develop a Team-based Learning Process for Application
Objectives

- Describe three fundamental principles for creating conditions that foster learning in small groups
- Describe the “4 Ss” of effective group assignments
- Describe differences between individual and group-centered learning
Reason for Development of Team-Based Learning

- The Key To Quality Education:
  - We will not meet the needs for more and better higher education until professors become designers of learning experiences and not teachers.

- Larry Spence (2001)
- Coaching more than Teaching, Lecturing
Goals of Education

Educational goal is not to have students gain “memorized knowledge” but rather focus on developing learners who can engage in complex thinking and reasoning.
TBL as Support for Curriculum

- Traditional lecture still useful for delivering large amounts of information delivered by content expert
  - Student is passive recipient of this material, takes notes, can ask questions for clarification
- TBL gets students involved in learning, group discussion, and uses knowledge content as a basis for applying this knowledge in clinical, authentic situations
Helping students learn how to use course concepts to solve real-world problems

3 phases of learning occurs in team-based strategies:
- Preparation
- Readiness assessment
- Application of course concepts
TBL Priorities

- Development of Reflective Thinking:
- Ability of the students to perform problem-solving and reasoning skills
- Recognition that they must make assumptions in order to problem solve
- Engagement in complex thinking and reasoning that is needed for clinical practice
- Traditional lecture courses are not typically conducive in developing these critical thinking/application skills
Limitations of Lecture-Based Delivery of Education

- Inability to retain information after course ends
- Inability to transfer knowledge to novel situations
- Inability to develop skills in thinking or problem-solving
- Limited ability to achieve effective outcomes, such as motivation for additional learning or a change in attitude
Traditional Learning Goals: The Current State

- Students in PA education focus on grades rather than on learning
  - Need to successfully meet academic requirements in order to be retained in the program with appropriate educational progress

- Students are pressed for time in these accelerated programs
  - Short-changed in completion of reading assignments
  - Teachers must work harder to try to cover this material

- Student perspective is that they are working very hard, copiously take notes, and then cram for exam after exam
  - Less engaged in learning material that they do not see as pertinent. If teacher is not engaged, neither will be the student.
Team-Based Learning (TBL):

- Emphasis on “active” learning—learning that requires applying knowledge to authentic problems;
- Teaches students to engage in the kind of collaboration that is expected in today’s team-based health care delivery;
- Focus on acquiring knowledge rather than covering content.
Since students know that they will be given case scenarios based upon this material, they will “think through” the information and reflect on whether they really understand it.

Clinical Cases (not tests) impact their studying since they know that they will have to understand the material, make logical leaps and connections, and then make decisions about patients.

They are more interested learners/participants.
Faulty Role with TBL

- Assign Students to Teams;
- Tell the students what the content is that they need to master (transparency, no trivial questions);
- Create challenging (authentic) problems for the students to solve (hardest part for the faculty);
- Probe the students’ reasoning as to how they came to solve these problems;
- Students learn more when they are questioning, debating, teaching one another, and discussing
Student Engagement

- Hallmark of TBL.
- If PA students are fully engaged, challenged intellectually, and have the opportunity to develop interpersonal and teamwork skills, these engaged students will have deeper learning and ability to make and defend their healthcare decisions.
Health care professionals become clinicians when they are given responsibility to care for others.

TBL requires that teams of individuals judge and make decisions and then explain as to how they arrived at this decision.

Dialogue and debate within a team and between teams teaches students about judgment and they practice the skill set for making these judgments and therefore, are deeply engage with the content.

Judgment becomes the foundation of sound clinical reasoning.

MASTERY OF CONTENT SO IT CAN BE APPLIED AT THE BEDSIDE
Advantages to TBL

- Can be done in large classes held in lecture halls
- Only one teacher needed for facilitation of class
- Students prepared for class and fully engaged for entire class period
- Can address several professional core competencies simultaneously:
  - Communication, interpersonal skills, teamwork skills (including giving and receiving feedback), knowledge acquisition, and application of knowledge to real case problems.
- Academic achievement the same or better than traditional lectures
  - May have advantages with long-term retention and actual patient care decision-making
Learning in Teams

- Individual accountability promotes preparation
- Group accountability promotes effective participation
- Goal-driven collaboration promotes learning
- Controversy stimulates discussion
- Peer pressure fosters desire to succeed
Conversion of PBL and lecture format to TBL outcomes:

- Culture at institution supported TBL.
- Student evaluations of TBL are uniformly excellent.
- Faculty who incorporate this into their classes would not go back to previous pedagogies.
Engagement: effective only with goals in mind

Why Peer Discussion Improves Student Performance on In-Class Concept Questions


When students answer an in-class conceptual question individually using clickers, discuss it with their neighbors, and then revote on the same question, the percentage of correct answers typically increases. This outcome could result from gains in understanding during discussion, or simply from peer influence of knowledgeable students on their neighbors. To distinguish between these alternatives in an undergraduate genetics course, we followed the above exercise with a second, similar (isomorphic) question on the same concept that students answered individually. Our results indicate that peer discussion enhances understanding, even when none of the students in a discussion group originally knows the correct answer.

In every published report of student improvement with the use of clickers, the course included student collaboration of some form.
Bloom's Taxonomy Verbs

When developing curriculum for your class, keep this list nearby. This will help you determine the level of response you are anticipating from your students.

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Count, Define, Describe, Draw, Find, Identify, Label, List, Match, Name, Quote, Recall, Recite, Sequence, Tell, Write</th>
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<tbody>
<tr>
<td>Comprehension</td>
<td>Conclude, Demonstrate, Discuss, Explain, Generalize, Identify, Illustrate, Interpret, Paraphrase, Predict, Report, Restate, Review, Summarize, Tell</td>
</tr>
<tr>
<td>Application</td>
<td>Apply, Change, Choose, Compute, Dramatize, Interview, Prepare, Produce, Role-play, Select, Show, Transfer, Use</td>
</tr>
<tr>
<td>Analysis</td>
<td>Analyze, Characterize, Classify, Compare, Contrast, Debate, Deduce, Diagram, Differentiate, Discriminate, Distinguish, Examine, Outline, Relate, Research, Separate</td>
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<tr>
<td>Synthesis</td>
<td>Compose, Construct, Create, Design, Develop, Integrate, Invent, Make, Organize, Perform, Plan, Produce, Propose, Rewrite</td>
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<td>Evaluation</td>
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Powered by: The Online Teacher Resource (www.teach-nology.com)
Engagement: to what end, and by what means?

Bloom’s Taxonomy of Cognitive Skills

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

McNeil’s Hierarchy of Student Engagement

- Observation
- Reflection
- Interaction
- Participation
- Contribution
Engagement: to what end, and by what means?

At each given level...

the student is:

- **observation**
  - receptive to / recording course content
e.g. watching, listening, writing

- **reflection**
  - assimilating, thinking about, assessing content
e.g. considering, contemplating, self-questioning

- **interaction**
  - responding, anticipating, questioning content
e.g. asking/answering questions, peer discussion

- **participation**
  - presenting part of course content
e.g. student-based demos, reports,

- **contribution**
  - creating and delivering course content
e.g. student presentations, web pages

At each given level...

the student is:

- active
- passive
## Three Phases of TBL

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Individual Preparation

- Student is given individual assignment to complete prior to class
  - Expert guidelines
  - Evidence-based topic
  - Pre-recorded POD cast lecture
- Learning outcomes are simultaneously given to guide student learning
- Student is aware that first class activity will be readiness assurance test
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Student takes a multiple choice test as an individual and these tests are collected and graded.

Graded assignment is part of the student’s grade.

Single best answer is picked.

Test should be challenging in order to prepare for what lies ahead.
Forming the Group

- Group size 5-7 students
- Groups discuss the quiz and then are prepared for the application exercises
- One teacher with content expert needed to organize the application exercise
- Group as diverse as possible - typically, this is easy in PA education
- Group consistent throughout the semester/year
Choose the BEST way to get students into teams:

A. Base it on the type and amount of previous clinical experience
B. Do it randomly
C. Review their grades in other courses and assign to achieve “balance” in the teams
D. Use standardized test scores to assign so every team has similar scores
E. Could be based upon program entry exam such as that given for medical terminology
Group Readiness Assurance

- Now, take the SAME TEST again as a team
- The ‘IF-AT’ forms are now used for the group
  - Immediate Feedback Assessment Technique
  - Group has to reach consensus on single best answer
  - Group dynamics add to the breadth and depth of understanding
Using the ‘IF-AT’ form

- Decide with your group which is the correct answer and scratch that answer on the form.
- If there is a ‘*’ beneath the answer you scratched, you got the question correct; move on to the next question.
- If there is not a ‘*’, keep scratching until you find the answer with the ‘*’.
- Points will be scored as follows:
  - Correct answer on the first scratch: 4 points
  - Correct answer on the second scratch: 3 points
  - Correct answer on the third scratch: 1 point
  - Correct answer on the fourth scratch: 0 points
The Principle of “Backward Design”

1. CONTEXT & GOAL – What do you want students to be able to DO?

2. GROUP APPLICATION EXERCISE – The answers cannot be ‘looked up.’ Only come from discussion.

3. READINESS ASSURANCE – Truly foundational to the Group Application Exercise.

4. PREPARATION – Be specific, but know they will learn more to not let their team down.
What do they need to know to solve the problems?

Be specific with your objectives and assignment.

The Readiness Assurance process must be foundational to the Group Application Exercise.
Principles of Good Application Assignments

- **Same Problem**
- **Specific Choice**
- **Simultaneous Reporting**
- **Significant Problem**

**The 4 S’s**

- Problems that require the brainpower of the whole team to solve
- All answers PLAUSIBLE with one BEST with other very ‘close’ answers
- Teams teaching teams
Top students are held back when they are required to work in a group.

True? or False?
Gain (or loss) based on comparing the score of each team to the score of its own BEST member.

### Are Top Students Held Back by Teams?

<table>
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<tr>
<th>Team</th>
<th>Individual Scores</th>
<th>Team Score</th>
<th>Gain</th>
<th>% Gain</th>
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<td></td>
<td>Low</td>
<td>Avg</td>
<td>High</td>
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<td>1</td>
<td>137</td>
<td>173.0</td>
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<td>180</td>
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<td>Avg</td>
<td>165.9</td>
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Every team score is higher than its own BEST member (avg. = 36.3%)
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Having the score of the lowest team higher than the highest individual in an entire class is:

- Highly unusual?
- The normal outcome?
- Not sure?
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Gain (or loss) based on comparing the score of each team to the score of its own BEST member.

Lowest team is 4.8 points higher than the highest individual in the entire class.
Since 1986—6,161 students in 1,115 teams:

- 1,114 teams scored higher than their own BEST member (99.9+% of teams).
- 1 individual outscored his team (<.1% of teams).
FINK’s TAXONOMY OF SIGNIFICANT LEARNING

- **Learning How to Learn**
  - Becoming a better student
  - Inquiring about a subject
  - Self-directing learners

- **Foundational Knowledge**
  - Understanding and remembering:
    - Information
    - Ideas

- **Caring**
  - Developing new...
    - Feelings
    - Interests
    - Values

- **Application**
  - Skills
  - Thinking
    - Critical, creative & practical Thinking
  - Managing projects

- **Human Dimension**
  - Learning about:
    - Oneself
    - Others

- **Integration**
  - Connecting:
    - Ideas
    - People
    - Realms of life
FINK’s INTERACTIVE NATURE OF SIGNIFICANT LEARNING
Team Learning Phases

Phase 1
Preparation (pre-class)

Phase 2
Readiness Assurance

Phase 3
Application of Course Concepts

Individual Study

Instructor Feedback

Written Group Appeals

Individual Test

Group Test

Small-group Assignments
Levels of Questions

1) Make a List
2) Make a Choice
3) Make a *Specific* Choice
Application: Which assignment or activity would be MOST effective at ensuring that students:

1. Think deeply about the concepts?
2. Actively engage in a high-energy discussion related to the concepts:
   - Within groups
   - Between groups (in the class as a whole).
Instructional Principles That Unleash the Power of Learning Teams

- Individual accountability promotes preparation
- Group accountability promotes effective participation
- Goal-driven collaboration promotes learning
- Controversy stimulates discussion
- Peer pressure fosters desire to succeed
Principles Operationalized: To create favorable conditions for learning in small groups:

1. Use assignments that promote individual and group accountability
2. Use assignments that link and mutually reinforce individual work, group work, and total class discussions
3. Adopt practices to stimulate give-and-take interaction within and between groups
Forming Teams…

- **Principle:** When forming teams, you want to ensure equal distribution of resources and maximize participation of all members.

- **Operationalized:**
  - The teacher forms the teams
  - Teams stay throughout the semester/year
Individual Readiness Test

- Can just choose the single best answer
  - Student gets the question correct or not
  - Easier to grade but unable to tell whether student mastered the material or merely had a good day guessing
Group Readiness Test

- “IF-At” scoring sheet
- Keep rubbing off the choices until the correct star “*” is revealed
- The more answers that are revealed, the less points are awarded
- This grade will be assigned to the entire group
Grading

- Students allowed to choose percentage of grades that are individual versus group
- Cannot be more than 70-30 split
- At the end of the course, individual grades and group grades are calculated BUT one additional modifier is used......
Peer Review

- At the end of the semester, students will grade members of the group which will impact the final grade.
- Easiest to allow 100 potential points per group:
  - Students must award points to all members.
  - Students cannot give the same amount of points to each member.
  - Final tally will be the multiplier for the final grade after quiz averages are compiled.
Three Phases of TBL

Team Learning Phases

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- Individual Study
- Instructor Feedback
- Written Group Appeals
Application Questions

- Case-based scenarios which provides 4-5 potential choices that are plausible
- Complicated cases so that discussion occurs
  - Diabetic patient with hypertension, coronary artery disease, and renal failure who is failing glucose control
  - Learner has to consider various possibilities and make judgment for correct answer
  - One answer better than all plausible answers
Application Exercises are NOT Graded

- Application questions reinforce learning
- Learning for the sake of learning
- No pressure for assigned grades—lets students debate and discuss—real learning taking place
- Sends a clear message that team-based decisions are what matters
Importance of Application Exercises

- Need to develop logical thought processes to render care in the clinical setting
- These questions are ideal to develop for interdisciplinary training
- When these discussions occur, student learning and retention are enhanced
Penn State College of Medicine uses TBL for enhancing patient safety

- Multidisciplinary approach for team care
- Currently, medical students, residents, public health students, and nursing students develop these systems - future physician assistant students will be included
For more info:

http://teambasedlearning.org

or Google: “team based learning collaborative”