TEACHING AND LEARNING IN MEDICINE

CURRICULUM RENEWAL
Thinking about Teaching?

○ Planning for instruction:
  ○ Theories of teaching and learning
    ○ Behaviourist, cognitivists, constructivists, humanism, social….
  ○ Adult learning principles
  ○ How learning happens
    ○ Learning cycles (Kolb)
    ○ Learning styles (?)
  ○ Teaching practices
    ○ Chickering and Gamson
    ○ McKeachie
Problems in Medical Education:

- Too much information
- too little time,
- too many students in crowded rooms, and
- exams that discourage real learning

*Advan. Physiol. Edu. 31: 283-287, 2007*
Teaching learning theory in medical education suggests that medical students and physicians will learn best when learning (select one)

1. Is in the context of patient care?
2. Answers their questions?
3. Is not directly applicable to their work?
4. Does not take too much time?
“Half of what you are taught as medical students will in 10 years have been shown to be wrong.”

And the trouble is none of your teachers know which half.

So the most important thing to learn is “how to learn on your own”.

Dr. Sydney Burwell, Dean Harvard Medical School In: Evidence based medicine, Sackett et al, 2000: 31
The old way of learning was knowing what you should know…

Now the way of learning is knowing what you don't know, not feeling bad about it, and knowing how to find out.

BMJ 2003;327:1430-1433
Principles of Adult Learning

- **Apply** what is learned shortly after learning it.

- Emphasize learning *concepts and principles* over facts.

- Students **participate** in setting own learning objectives.

- Students use **feedback** to evaluate their own performance.
Goals for the New Curriculum

- Increased active learning
- Decreased passive learning
- More continuity for teachers and learners
  - Better curricular cohesion
- Teach not only cognitive, affective and psychomotor, but also metacognitive (= life long learning)
How?

Move from teacher centred to learner centred

- **Teacher-Centered** ~ Topics are broken down into units of instruction. Emphasis is on the *accumulation of facts*.

- **Learner-Centered** ~ Students answer their own questions and solve their own problems. Emphasis is on *application of knowledge and skills*.
<table>
<thead>
<tr>
<th>Teaching/learning methods</th>
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<tr>
<td><strong>Whole Group Learning</strong></td>
</tr>
<tr>
<td>(Conventional lectures and “taught” lessons; Film and video presentations; group projects, Educational broadcasts; mass practical work)</td>
</tr>
<tr>
<td><strong>Individualized learning</strong></td>
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<tr>
<td>(Directed study of texts, study of open-learning materials; mediated self-instruction; PBLs.)</td>
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<tr>
<td><strong>Small Group learning</strong></td>
</tr>
<tr>
<td>(Discussions; PBLs, seminars; group tutorials; games and simulations; group projects; etc.)</td>
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</table>
Whole Group Learning

• How can we make this more active?
  • Large group as a whole
    • Questioning
    • Case based teaching
    • Effective lecturing practices (slides, pacing, structure/planning)
  • Flipped classroom
• Small groups in the large group
  • TBL
CASED-BASED TEACHING: Models and Methods

Adapted from
Judy Garner, Ph.D.,
Department of Cell and Neurobiology
Keck School of Medicine
Distinguished Fellow, CET
CASE BASED TEACHING:
Teaching by example or stories

• An alternative or adjunct to lecturing
  • Large or small group.
• Application of concepts to practical experience
• Or vice versa
What is a case?

- “a case is a descriptive document, often presented in narrative form, that is based on a real-life situation or event.
- “It attempts to convey a balanced multidimensional representation of the context, participants, and reality of the situation.
- “Cases are created explicitly for discussion and seek to include sufficient detail and information to elicit active analysis and interpretation by users with differing perspectives.”

—Katherine Merseth, ERIC digests, ERIC clearinghouse on Teaching and Teacher Education, Washington, D.C.
Value of cases

- Help connect **concepts and practice**
- Develop decision-making or problem-solving skills
- Raise the level of critical thinking
- Enhance listening/cooperative learning
- Understand the relevance of context
- A method of delivering multiple points of view
What do cases bring to learning?

- Collaborative learning and working in groups

- Cases can be used with variable degrees of student-student interaction
  - Online
  - In large class
  - In small groups
  - Individually
Learning Outcomes?

• Allow for achievement of higher order objectives:

• Example:
  • “Describe the chemical structure of a benzene ring.”
  • “Evaluate the role of the structure of a benzene ring in pharmaceuticals (or drug X)”
Learning Outcomes: What do you expect?

Example:

Evaluate the role of the chemical structure of a benzene ring in ..... Drug X

To get an answer the student must:

1. Know the chemical structure of a benzene ring
2. Determine how the benzene ring interacts with other organic chemical forms?

And may, through the use of a case (pharmaceutical case) take it further.

1. How do you chemically alter a benzene ring?
2. Would that be useful in attempting to alter the efficacy of a particular pharmaceutical compound?
Elements of Case Design

• Selection of appropriate cases:
  • Mirror professional experience/real world context
  • Complex or simple?
    • Depends on learning objective,
    • student context and
    • placement in the curriculum
SIMPLE CASE

• Example from MedEdPortal.org

• Used in large class:
  • Could use Audience response system….
Objectives for T1 Tutorial

• Compare and contrast the ‘fight or flight’ response of the sympathetic division and the ‘rest and digest’ response of the parasympathetic division of the autonomic nervous system.

• Map the neural circuit of autonomic outflow from the central nervous system to the effector organ

• Describe the organization of neurotransmission in the autonomic nervous system

• Explain the concept of neurotransmitter receptors and neuropharmacologic intervention in regulating autonomic responses
Clinical Case: Thyroid storm

❖ A 19 yr old woman was seen in ED after a minor automobile accident. She complained of dizziness and weakness.

❖ During the history, she was confused and disoriented.

❖ She appeared pale and diaphoretic (sweating profusely). Her temperature was 102°F.

❖ Her vital signs included a blood pressure (BP) of 170/70 mm (re. 120/80) Hg, pulse (P) of 190 bpm (re. 60), respiratory rate (RR) of 34/minute (re. 12).

❖ Her condition was deemed critical and she was administered propranolol for ventricular tachycardia and methimazole to reduce circulating thyroid hormone levels.
Question 1

In this patient, what accounts for the global response to injury by the cardiovascular, respiratory, and integumentary systems?

Select answer

- Sympathetic stimulation
- Parasympathetic stimulation
- Somatic stimulation
- Endocrine stimulation of corticosteroids

Drawing by CK Henkel
The peripheral nervous system has two major motor components effecting specific targets: somatic motor to skeletal muscle and autonomic (or visceral) motor to smooth and cardiac muscle and to glands.

The autonomic system has two divisions: sympathetic and parasympathetic.
A sympathetic motor response is described as ‘fight or flight’ globally activating cardiovascular and respiratory systems, restricting digestion, increasing sweating, and shunting blood from the periphery and gut to skeletal muscle.

A parasympathetic motor response is described as ‘rest and digest’ targeting specific systems to slow the heart or constrict the respiratory tree or stimulate digestion and glandular secretion, defecation, or micturition.

It also has been referred to as a ‘breed, read, and feed’ response since it activates the constrictor of the pupil and dilator of the lens for near vision and also controls erection in the human sexual response.
The autonomic nervous system innervates smooth muscle in visceral organs and other structures such as glands and blood vessels and cardiac muscle in the heart.

Most organs in the body have dual motor innervation by both components of the autonomic nervous system, but most peripheral vessels and glands do not.

The sympathetic and parasympathetic innervation to an organ may have reciprocal (excite-inhibit) or complementary (stimulate secretion-increase blood flow) functions.
Stimulation of the sympathetic division of the autonomic nervous system causes a global (rather than targeted) fight or flight response with increased heart rate and cardiac output, increased respiration, shunting of peripheral blood flow toward skeletal muscles and away from the skin, and activation of sweat glands.

The sympathetic response is coupled with endocrine function particularly release of adrenalin from the medulla of the adrenal gland.
Parasympathetic stimulation is described as a rest and digest response. It is more targeted, causes bradycardia (slowing of the heart rate and cardiac output), and in general does not regulate the distribution of superficial (peripheral) blood flow.
Somatic stimulation

The somatic motor system innervates skeletal muscle, not visceral organs, blood vessels, or sweat glands.

Wrong answer 🎨

Figure by CK Henkel
The adrenal cortex is regulated by the pituitary gland.

Corticosteroid release by the cortex of the adrenal glands in response to stress plays an important role in regulation of water and salt and metabolism of carbohydrates, fat and proteins.

Sympathetic innervation to the adrenal cortex increases blood supply to facilitate delivery of the corticosteroids.
Question 2

Which of the following describes the origin of the final common motor pathway of the sympathetic input to the cardiovascular system that elicits tachycardia (rapid heart rate) in this patient?

Select answer

- Visceral motor neurons in CN X brainstem nuclei
- Visceral motor neurons in ventral horn of spinal segments T1-T4
- Visceral motor neurons in lateral horn of spinal segments T1-T4
- Visceral motor neurons in Intermediate gray of spinal segments S2-S4
COMPLEX CASES

- CASES IN AN INTEGRATED MEDICAL CURRICULUM

- EXAMPLE: Neurosciences from Keck School of Medicine
Neurosciences in Medicine

- Neuroanatomy
- Neurophysiology
- Neurochemistry
- Gross anatomy of the Head and Neck
- Neuropathology
- Neurology
- Ophthalmology
- Neuroradiology
- Neurosurgery
- Psychiatry
- CNS and Autonomic Pharmacology
Choice of cases

Case selection must take into account

- How **common** is the case in real life
- Ability of the case to integrate **multiple sub-disciplines**
- Ability of the case to effectively teach **important learning objectives** in the course
- The case must **not be too burdensome** in the acquisition of data for the answers
CHOICE OF CASES

- Sequence of Cases determined by:
  - Prior knowledge
  - Logical order
  - Early cases re-visited as system progresses and knowledge increases
  - Link with other concurrent courses
    - Longitudinal courses
    - Themes
CASE THEMES OF THE WEEK

Introduction of Cases:

Week 2: Trauma, Substance abuse, Acute Stress Disorder

Week 3: Parkinson's Disease with Depression

Week 4: Stroke with Adjustment Disorder

Week 5: Panic Disorder (Brain tumor)

Week 6: Herpes Encephalitis, Status Epilepticus, Delirium

Week 7: Evidence based medicine (Stroke studies)

Week 8: Alzheimer’s Disease with Psychosis.
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<tr>
<th>Week 1</th>
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<tbody>
<tr>
<td><strong>INTRO to NS I</strong></td>
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<tr>
<td>Neural Cell Biology</td>
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<td>CNS Development</td>
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<td><strong>Neuroanatomy Lab</strong></td>
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<td><strong>Mentor Group</strong></td>
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KEY: Each Lecture/Laboratory that corresponds to:

PPP Case 1: Trauma, substance abuse, Acute Stress Disorder
PPP Case 2: Parkinson’s Disease with Depression Disorder
PPP Case 3: Stroke with Adjustment Disorder
PPP Case 4: Generalized Anxiety Disorder (Brain Tumor)
PPP Case 5: Herpes Encephalitis, Epileptic seizures, Delirium
PPP Case 6: Alzheimers Disease with Psychosis

Development Series
Autonomic Nervous System Series
Special Senses Series
Neuromuscular series
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**Mentor Group**

<table>
<thead>
<tr>
<th><strong>INTRO to NS II</strong></th>
<th><strong>ICM WORKSHOP:</strong> <strong>MENTAL STATUS EXAM</strong></th>
<th><strong>Students receive case plus reading assignments in case book</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Neuroanatomy Lab</strong></td>
<td><strong>Microanatomy of the CNS</strong></td>
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<tr>
<td>Chemical Neurotransmission</td>
<td>ICM</td>
<td>Motor Neurons and Spinal Reflexes</td>
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<td><strong>Limb-Axial Somatosensory Paths</strong></td>
<td>ICM</td>
<td>Upper Motor Neurons/Lower Motor Neurons</td>
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<tr>
<td>NA Lab</td>
<td>ICM</td>
<td>NA Lab</td>
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<tr>
<td><strong>Mentor Group</strong></td>
<td><strong>Headache</strong></td>
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<td></td>
<td><strong>Sensory Cranial Nerves and Paths</strong></td>
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<tr>
<td><strong>WORK ON PPP CASE #1</strong></td>
<td><strong>NA Lab</strong></td>
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<tr>
<td>ICM Workshops Neurological Exam</td>
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<tr>
<td>Otolaryngology Exam</td>
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<tr>
<td>Ophthalmology Exam</td>
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<tr>
<td>Motor Cranial Nerves</td>
<td>ICM</td>
<td>Acetylcholine Innervation patterns to the head and neck</td>
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<tr>
<td>Motor Cranial Nerve Lab</td>
<td>Autonomic Nervous System</td>
<td>Gross Anatomy Lab</td>
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<tr>
<td>Corticobulbar paths</td>
<td>Movement Disorders</td>
<td>Movement disorders Cases</td>
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<td>Mentor Group</td>
<td>Mood Disorders</td>
<td>ICM Workshops Neurological Exam</td>
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<td></td>
<td>Basal Ganglia</td>
<td>Otolaryngology Exam</td>
</tr>
<tr>
<td>WORK ON PPP Case 2</td>
<td>NA Lab</td>
<td>Ophthalmology Exam</td>
</tr>
</tbody>
</table>
Example of a Case:

1) Patient History and Symptoms:

Fred Hoskins, a 17-year-old boy, was admitted to the emergency room at 1:30 (AM) after a car accident.

Fred’s friends, who had also been involved in the car accident, had told EMT personnel that Fred had been trapped in the car upside down, suspended from his seatbelt, and it took the firemen over an hour to release him from the wreckage.

During the accident, Fred had received a blow to the head and had been rendered briefly unconscious after the accident but had regained consciousness within a few minutes.

He had been terrified throughout the entire ordeal that the car would explode. His friends had also told EMT personnel that Fred had been at a “rave” prior to driving home.

In the emergency room, his examination was normal but he was sleepy, and he was held for observation.
2) RELEVANT DATA

- Vital Signs on admission
- Test Results: Drug screen, Blood Alcohol, CT
- Further sequelae: time course
- Surgery
- Post surgical interview after hospital admission
- Detailed post-release interview
CASE THEMES OF THE WEEK

Receive the case on Friday:

Written case with ~6 general discussion questions received

Examples:

❖ What is your differential diagnosis? Include in your answer a discussion of how you would differentiate among the different types of intracranial hemorrhages.

❖ What psychiatric disorder does this patient manifest after the accident that wasn’t present before it? How is it diagnosed? It appears to be a good predictor of what other major psychiatric disorder?
CASE THEMES OF THE WEEK

**Monday afternoon:**
Small groups meet after doing reading. Discussion of general diagnosis, and negotiation for answer “responsibility” of individual students. Later in the week the students share answers so each has a complete set.

**Monday through Thursday:**
Students share answers so each has a complete set.

**Friday morning:**
Students present answers to the questions to their peers and instructor (experts) with discussion as different answers are discovered.
How can one distinguish among subdural, epidural, subarachnoid, or intraparenchymal hemorrhage? Which of these types of hemorrhage is evident in the CT scan?

1) **Epidural bleeds** (between the dura and the cranium) are usually confined to the limits of the overlying cranial bone (the dura adheres to the suture points). The smooth contour of the hematoma in the CT suggests the blood is confined in the space between the bone and dura. Patients with epidural bleeds are often characterized as experiencing a brief period of unconsciousness, followed by a conscious lucid period, then later lapsing back into unconsciousness.
Case 2: Data

- Epidural Hematoma
- Subdural Hematoma
- Subarachnoid Hematoma
- Intraparenchymal Hematoma
Case 2: Trauma with Acute Stress Syndrome: Mapped to Learning Objectives

After examination of this case, each student should be able to:

- Distinguish among subdural, epidural, subarachnoid, and intraparenchymal hemorrhage. *(N, Npath, GA, NA, NRad)*
- Discuss the pupillary light reflex and oculomotor signs in terms of CNS herniation. *(NA, GA, N)*
- Describe the progression of herniation. *(GA, NA, N)*
- Explain the significance of papilledema. *(N, GA, Npath, Ophthal)*
- Define the difference between substance abuse and substance dependence. *(Pharm, Psych, NC)*
- Define the criteria for Acute Stress Disorder. *(Psych)*
- Describe, in general, the treatment plan for epidural hematoma. *(N, Nsurg, GA)*
- Describe, in general, the treatment plan for Acute Stress disorder. *(Psych, GA, Pharm)*
SUMMARY:

The use of complex cases:

- Facilitates understanding of the complexity of real life situations to be faced by medical students
- Allows abstract conceptual information to be applied to situations likely to be experienced by the students
- Integrates information from multiple subdisciplines and multiple points of view as it is focused upon a single problem
- Helps the students recognize that even in sciences there is not always a “right” and a “wrong” answer
- Underscores the professional value of cooperative learning and working
Questions about Case Based Learning?
Team Based Learning

Transformative Learning

Sandra Schonwetter and Joanne Hamilton
Adapted from
Faculty Development Program
Office of Medical Education
Boston University School of Medicine
Learning Objectives:

By the end of this session, you will be able to:

- Define Team Based Learning (TBL)
- Describe the four essential Elements of Team-Based Learning
- List the steps to implement Team-Based Learning in a course
Conduct RATs
Team-Based Learning

Course Objectives

By the end of the course, the student will be able to:

- Master the course subject matter
- Utilize the course concepts in thinking and problem-solving
- Develop interpersonal and group interaction skills
- Prepare for life-long learning

Meets LCME guidelines

*From Baylor College of Medicine, Team Learning in Medical Education

What is TBL?

Purpose of Team-based learning

Similar to lecturing
Team Based Learning*

Small groups of students interact as in-class teams to apply content to simple and complex problems with the feedback of the instructor as the content expert.

*Team Based Learning was developed in the 1970’s by Dr. Larry K. Michaelsen, a Professor of Management at the University of Oklahoma, who wanted to change the passive learning in his lectures into active learning by testing and assigning students to teams.
# Team-Based Learning Process

## What is TBL?

### Phase 1: Preparation (Pre-class)
- **Individual Study**

### Phase 2: Readiness Assurance (In-class)
- **Group Test**
- **Individual Test**
- **Instructor Feedback**
- **Team Appeals**

### Phase 3: Application of Course Concepts
- **Small Group Assignments**

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<tr>
<th>Individual Work</th>
<th>Small Group Discussion</th>
<th>Total Class Discussion</th>
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<tr>
<td>X</td>
<td>X</td>
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</table>

= Impact on Learning
Phase 2: Readiness Assurance Test

**Procedures**

**Individual Test**
- Closed Book
  - 3pts/question
- Answer both on test and answer sheet
- Answer sheet goes in Team folder

**Team Test**
- Closed Book
  - 3pts/question
- Place Team # on answer sheet
- Use score sheet for grading

**Appeals**
- Open book
- Show evidence from reading

**Questions & Discussions**
- Clarify issues

What is TBL?
Phase 3: Application-Focused Assignment

Groups apply the fundamental concepts of the unit to a problem (50% class time) to produce an answer, product or idea

- **Examples**
  - answer a multiple-choice question set of 3 for a case vignette
  - develop a treatment plan (short answer)
  - justify your diagnosis
  - explain the difference
  - compile a list of manifestations/complications
4 Essential Elements of TBL*

No matter how you customize your TBL class, you must have these 4 principles or TBL will not work:

1. Properly formed and managed groups

2. Student accountability for pre-class preparation and team performance

3. Team activities that promote learning, group interaction and team development

4. Frequent and immediate student feedback provided through RATS and application-focused team assignments

*From Michaelsen, Larry K. “Getting Started with Team Learning.”
Essential Element: Group Formation

- **Group Cohesiveness Developed**
  - Minimize barriers by avoiding previously established groups
  - Mix students to establish new groups from ground up

- **Group Resources Distributed**
  - **Assets**: life and work experiences, previous courses, etc.
  - **Liabilities**: no previous experience, limited fluency in English
  - Evenly distribute resources for learning teams to work effectively

- **Group Size**
  - Large enough to maximize resources (5-7 members)
  - Large enough to allow full participation of members

- **Group Permanency**
  - As groups become teams, communication is easier and helps learning
  - Teams members willing to challenge each other for success of team
Essential Element: Student Accountability

- **Pre-class Preparation**
  - Readiness Assurance Test evaluates pre-class preparation
  - Individual preparation necessary for Group Test and Team work

- **Contribution to Team**
  - Peer assessment of each member’s team work
  - Performance of team to develop a product

- **Grading**
  - Individual’s preparation for work
  - Individual’s contribution to the team
  - Effectiveness of the team
Essential Element: Team Application Activities

- **Appropriate team work**
  - Require group interaction
  - Members make decisions and report in simple form

- **Inappropriate team work**
  - Results in problem with learning teams (free-riders, member conflict)
  - Requires members to divide the work and complete it individually for a complex output (e.g., lengthy document or oral presentation)
  - Limits interaction and difficult to compare performance of teams
Essential Element: Frequent and Immediate Feedback

Regular and timely student feedback on group performance by:

1. Readiness Assurance Tests (RATS)
   - Informs students how effective their learning procedures are
   - Pulls together group members since **Group scores are public**
   - Informs group immediately when and how they failed to perform

2. Application-focused Team Assignments
   - More difficult to evaluate than RATS due to higher level learning skills
   - Provide a process to give peer review
Team-Based Learning FAQs*

1. How much material can be covered in Team-Based Learning?
   The same or more material can be covered in TBL as in traditional lecture format.

2. What is the most important element in Team-Based Learning?
   Group Formation, Student Accountability, Feedback (Readiness Assessment Tests) and Team Assignments are the elements of Team-Based Learning and are equally important.

3. Where in medical education has Team-Based Learning been used?
   Team-Based Learning has been used in large group pre-clinical classes and clinical classes for 3rd and 4th students and residents.

4. What is the role of the faculty in Team-Based Learning?
   As the content experts, Faculty plays an active role providing feedback to the students, introducing new material and challenging the students with new questions.

*From Baylor College of Medicine, Team Learning in Medical Education, February 04 Workshops
Group Activity

- Name 2 barriers to using TBL at the UofM
- Solve them.
What is the TBL Difference*?

<table>
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<th>Lecture</th>
<th>Problem-Based Learning</th>
<th>Team-Based Learning</th>
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<tr>
<td><strong>Instructor’s role</strong></td>
<td>Identifies learning objectives, prepares presentations and answers student questions</td>
<td>Facilitates small group discussions and gives students feedback and guidance as needed</td>
<td>Identifies learning objectives and content, prepares readiness tests, answers student questions and prepares application assignments for team work</td>
</tr>
<tr>
<td><strong>Student’s role</strong></td>
<td>Attend lecture, study notes, prepare for exam</td>
<td>Identify learning issues, do independent out of class research, join group discussions</td>
<td>Do independent out-of-class study, join team discussions, defend team solutions to class</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>Content acquisition and conceptual understanding</td>
<td>Problem-solving abilities, critical reasoning, content acquisition, understanding, effective communication and small group interaction</td>
<td>Content acquisition, understanding, content application to solve problems, critical reasoning, effective communication, collaborative team work</td>
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<tr>
<td><strong>Teaching Methods</strong></td>
<td>Lecturer didactically provides content</td>
<td>Facilitators give cases and students analyze facts to solve case</td>
<td>Students prepare content before class. In class, they apply it in teams to solve problems</td>
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<tr>
<td><strong>What is TBL?</strong></td>
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<td>*Table excerpted from Baylor College of Medicine, Team Learning in Medical Education, September 2002</td>
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Steps to TBL

- Choose a unit or session where it fits
- Design an application exercise that suits group work and learning objectives
- Design the RATs
  - Clickers
- Explain TBL process to students
- Conduct the session.
- Reflect and evaluate
Sample
Team-Based Learning Process

Phase 1
Preparation (Pre-class)

Individual Study
- Attend a lecture
- Review Lab 2
- Read textbook or journal articles

Phase 2
Readiness Assurance (In-class)

Individual Test

Instructor Feedback
IRAT and GRAT assess student’s preparation to begin Group Assignment

Group Test

Phase 3
Application of Course Concepts

Small Group Assignments
Read case history and view visuals, then apply core concepts to complete group assignment

Level of Content Understanding
Questions?
Team Based Learning is a small learning group method where individual work is done outside the class and team work is completed in class.

The four elements of TBL are (1) properly formed and managed groups, (2) student accountability, (3) team assignments that promote learning, group interaction and team development, and (4) frequent and immediate feedback to students.

Implementation of TBL involves planning before the class, forming groups in the 1st class and reminding the students of the learning objectives, content application and team work near the end of the class.
TBL Websites

• Team Learning Collaborative, a public site developed as a team learning resource for medical educators, www.tlcollaborative.org

• Baylor College of Medicine, Team-Based Learning in Medical Education www bcm.tmc.edu/fac-ed/team_learning

• Team-Based Learning, University of Oklahoma www.ou.edu/idp/teamlearning

• Team-Based Learning Resources, Wright State University School of Medicine Faculty Development site, www.med.wright.edu/aa/facdev/TBL
Thank You!