Active Learning Styles

Cased-Based, Problem-Based and Team-Based Learning

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Learning Objectives

• Demonstrate an understanding of active learning and group facilitation.

• Discriminate between the three established models of active learning.

• Explore the application of active learning methods in medical education and information literacy instruction.

• Reflect on incorporating active learning models in their own instructional practice.
## Evidence of Deep Learning

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Significance</th>
<th>Significance</th>
<th>No effect</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum wide (n = 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep approach</td>
<td>7(^{ns}) increase</td>
<td>3 decrease</td>
<td>2</td>
<td>0.18</td>
</tr>
<tr>
<td>Surface approach</td>
<td>4(^{ns}) decrease</td>
<td>3 increase</td>
<td>5</td>
<td>0.08</td>
</tr>
<tr>
<td>Single course PBL (n = 9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep approach</td>
<td>4(^{ns}) decrease</td>
<td>1 decrease</td>
<td>4</td>
<td>−0.05</td>
</tr>
<tr>
<td>Surface approach</td>
<td>2(^{ns}) decrease</td>
<td>1 increase</td>
<td>6</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Bloom’s Taxonomy

Higher Order Thinking Skills

- Creating
- Evaluating
- Analysing
- Applying
- Understanding
- Remembering

Lower Order Thinking Skills
<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Analysis</th>
<th>Synthesis</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>List Name</td>
<td>Summarize</td>
<td>Solve</td>
<td>Analysis</td>
<td>Design</td>
<td>Evaluate</td>
</tr>
<tr>
<td>Identify</td>
<td>Explain</td>
<td>Illustrate</td>
<td>Organize</td>
<td>Hypothesize</td>
<td>Choose</td>
</tr>
<tr>
<td>Show</td>
<td>Interpret</td>
<td>Calculate</td>
<td>Deduce</td>
<td>Support</td>
<td>Estimate</td>
</tr>
<tr>
<td>Define</td>
<td>Describe</td>
<td>Use</td>
<td>Contrast</td>
<td>Schematize</td>
<td>Judge</td>
</tr>
<tr>
<td>Recognize</td>
<td>Compare</td>
<td>Interpret</td>
<td>Compare</td>
<td>Write</td>
<td>Defend</td>
</tr>
<tr>
<td>Recall</td>
<td>Paraphrase</td>
<td>Relate</td>
<td>Distinguish</td>
<td>Report</td>
<td>Criticize</td>
</tr>
<tr>
<td>State</td>
<td>Differentiate</td>
<td>Manipulate</td>
<td>Discuss</td>
<td>Justify</td>
<td></td>
</tr>
<tr>
<td>Visualize</td>
<td>Demonstrate</td>
<td>Apply</td>
<td>Plan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classify</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Active Learning Styles

Today we will discuss:

- Case-Based Learning
- Facilitation
- Problem-Based Learning
- Team-Based Learning
The goal of CBL is to prepare students for clinical practice, through the use of authentic clinical cases.

It links theory to practice, through the application of knowledge to the cases, using inquiry-based learning methods.

Case-Based Learning

• Students like it – learn more

• Teachers like it – better use of teaching time

• More engaged learners

• More structure (based on authentic clinical scenarios)
Case-Based Learning: Cases

- Authentic
- Common scenarios
- Educational value/Be applicable
- Stimulate interest
- Story/Include patient’s voice
- Defined learning outcomes
- Create empathy
- Promote decision making

National Centre for Case Study Teaching in Science
## CBL vs. PBL

<table>
<thead>
<tr>
<th>Case-Based Learning</th>
<th>Problem-Based Learning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working through a case</td>
<td>Working towards an understanding</td>
</tr>
<tr>
<td>Identifying learning issues</td>
<td>Answering a question</td>
</tr>
<tr>
<td>Guided inquiry</td>
<td>Resolution of a problem</td>
</tr>
<tr>
<td>Defined learning outcomes</td>
<td>Problem is encountered first</td>
</tr>
</tbody>
</table>
## Sequence of Cases

<table>
<thead>
<tr>
<th>Fall 2015</th>
<th>Monday (11/2)</th>
<th>Tuesday (11/3)</th>
<th>Wednesday (11/4)</th>
<th>Thursday (11/5)</th>
<th>Friday (11/6)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8:00 AM</strong></td>
<td>Course Introduction (R)</td>
<td>Service Learning</td>
<td>ALG: Case #1</td>
<td>SW (NR): Screening for colorectal cancer (AUD)</td>
<td>ALG: Case #1</td>
</tr>
<tr>
<td><strong>9:00 AM</strong></td>
<td>ALG: Case #1</td>
<td></td>
<td></td>
<td></td>
<td>(Intro – ALG #2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fall 2015</th>
<th>Monday (11/09)</th>
<th>Tuesday (11/10)</th>
<th>Wednesday (11/11)</th>
<th>Thursday (11/12)</th>
<th>Friday (11/13)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8:00 AM</strong></td>
<td>ALG: Case #2</td>
<td>Service Learning</td>
<td>ALG: Case #2</td>
<td>SW (NR): Continuation for screening for colorectal cancer and hazards (AUD)</td>
<td>ALG: Case #2</td>
</tr>
<tr>
<td><strong>9:00 AM</strong></td>
<td>Service Learning</td>
<td></td>
<td></td>
<td></td>
<td>(Intro – ALG #3)</td>
</tr>
</tbody>
</table>
Librarians as Content Experts in the Medical School Curriculum

With just six hours of lecture per week, CMSRU students spend the majority of their classroom time in Active Learning Groups (ALG). These case-based, self-directed learning environments are comprised of nine students, one biomedical sciences faculty facilitator, and one clinical faculty facilitator. This active learning environment builds the foundation for open communication, problem solving, and a team-based approach to medicine.

OBJECTIVES:

1. Establish librarians as content experts in efficient use of resources to find best answers to basic science and clinical questions.
2. Cultivate first year medical student life-long learning skills of comparing and contrasting resources.
3. Expand knowledge and skills of faculty-facilitators in applying use of library resources to case-based learning.
4. Lay the foundation for long term librarian relationships.

METHODS

Librarians consult with ALG faculty facilitators to select a case from fall semester of M1 year.

1. Faculty Development
   a. Develop sample basic science and clinical questions about the case based on outlined learning objectives
   b. Conduct a simulated two hour ALG session where faculty-facilitators are taught techniques for answering questions using library resources.

2. Active Learning Group Participation
   a. Rotate among 7 ALGs to assist students and faculty in the use of library resources at the point of need.
   b. Facilitate matching resources to answer the questions posed by each group.

SAMPLE CASE

While still enjoying your pediatric rotation, a 27 yr. old mother and 28 yr. old father bring their 5 month old baby boy to the hospital. The family is of northern European ancestry and this is their first child. The child is generally failing to thrive. Mom notes the baby does not seem to be gaining weight even though he is eating well.

She describes the baby as “colicky” and often flatulent. Parents use cloth diapers and they complain that the baby’s feces are foul smelling and greasy and that it makes cleaning the diapers almost impossible. They state that much of the baby’s stool floats in water. The baby also has chronic respiratory problems with nasal congestion and a wheezing cough that began dry but has progressed to produce thick yellow green mucus.

Learning Objectives:

- Genetics, monogenic vs polygenic, patterns of inheritance
- *NCBI’s Human Genome Resource* Genes of Interest Reference
- *Thompson & Thompson Genetics in Medicine*
- *Aspects of Cystic Fibrosis physiology*
- *Access Pediatrics* (Rudolph’s Pediatrics)*
- *Nelson Textbook of Pediatrics*
- *Dyrdahl (Genetics)*
- *Diagnostic Information*
- *Differential Diagnosis/Diagnostic Testing*:
- *EM Journal Students’ Pediatrics* *Manual of Diagnoses and Therapy* *PubMed* *Pediatrics in Review*

RESULTS

Faculty and students have accepted librarians as content experts in effective use of relevant resources to answer case-based questions.

Students exposed early in their M1 year to librarian expertise consult on a frequent basis.

Faculty-facilitators gained practical information literacy skills, useful in ALG sessions, curriculum development and daily work.

FUTURE PLANS

Program will be continued with incoming M1 class, Refresher ALG session planned for M2 students

Structured faculty development sessions for ALG facilitators are planned for summer of 2015
Attributes of a Facilitator

- Flexibility
- Courage
- Perceptive
- Passion
- Vision
- Respect
- Active Listener
- Neutrality
- Questioner
- Humor
- A Guide
Case-Based Learning

Facilitation: the Basics

- Ensure that students are prepared
- Careful listening = guided discussion
- Stay Impartial
- Don’t avoid conflict
- Discourage/Encourage
- Keep moving (list questioned facts/assertions)
- Comfort with pauses & silence
Case-Based Learning

Facilitation: the Problems

- Students who don’t contribute
- Students who dominate
- Non-involved Group
- Side-bar discussions
- Hostility/Derogatory Comments
- Digression
- Hair-splitting (petty or unnecessary distinctions of comparisons)
• Teach people, not subjects
• Know our learners
  – Needs, background, interests
• Diagnostic Information
  – What they already know/don’t know
  – What they can do/cannot do
  – What they care about/dislike
Case-Based Learning

Role of Students

• Examine current knowledge

• Build new knowledge

• Restructure their knowledge base

• Participate in group learning environment
Case-Based Learning

Role of Facilitators

- Acknowledge preparation
- Initiate discussion
- Encourage participation
- Help students communicate clearly
- Help students know what they bring to the table
- Encourage active listening
- Foster conversation
- Safe Environment
- Foster high-level thinking
Case-Based Learning

Role of Facilitators

- Invite learners to elaborate
- Help learners think together
- Help learners digest what they are hearing
- Acknowledge feelings
- Monitor flow of session (participant-observer)
  - Help students reflect
  - Share your observations
  - Intervene
Case-Based Learning

Cycle of Facilitation

Assessing/Diagnosing → Modeling

Fading

Coaching

Case-Based Learning

Facilitator Self-Assessment

• Adequate preparation

• Create collaborative environment

• Encourage active learning

• Monitor & facilitate flow of session
Mock Facilitation Session

Educational Theater / “Fish Bowl” Method

- Participants – 4/5 volunteers
  - each plays an assigned role
- Facilitator Role – Susan
15 Minute Break/Mock CBL to follow

**Group 1**
Dawn Hackman
Kristen Borysewicz
Linda Ray
Rick Van Eck
Meganne Masko

**Group 2**
Annie Nickum
Roseanne McBride
David Relling
Jeannie McHugo
Anne Mostad-Jensen

**Group 3**
Kelley Thormodson
Janet Rex
John Shabb
Bobbi Carlson
Makoto Tsuchiya

**Group 4**
Wendy Lehar
Megan Carroll
Arielle Selya
Sheri Altepeter
Alicia Champagne

**Group 5**
Holly Gabriel
Byronne Grove
Julie Grabanski
Susan Zelewski
Anna Blaine
Mary Coleman
Mock CBL Session

• Each group conducts a mock session
• One facilitator per group
• Roles are assigned to each participant
• Case Stem is released to group at start of session
• After about 15 minutes the next release of the case is given to the group
• Sharon & Susan will observe & assist if needed
Lunch!
Learning Objectives

• Demonstrate an understanding of active learning and group facilitation.

• Discriminate between the three established models of active learning.

• Explore the application of active learning methods in medical education and information literacy instruction.

• Reflect on incorporating active learning models in their own instructional practice.
Problem Based Learning

Definitions

• Student-centered approach which uses carefully constructed clinical problems as a context for students to: define their learning needs, conduct self-directed enquiry, integrate theory and practice, and apply knowledge and skills to develop a solution to a defined problem.

• Learning results from working with problems
PBL Roles

• Tutor
• Discussion Leader
• Scribe
• Participants
PBL stages

- Clarify problem description
- Define problem
- Analyze the problem
- Construct a working hypothesis
- Formulate learning objectives
- Self-directed study
- Report, Evaluate and Synthesize
## PBI and Bloom

<table>
<thead>
<tr>
<th>Levels</th>
<th>Group</th>
<th>SDL</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyzing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applying</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understanding</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Remembering</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### CBL & PBL Comparison

<table>
<thead>
<tr>
<th>Similarities to CBL</th>
<th>Differences from CBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involves higher-level of thinking and critical thinking skills</td>
<td>Role of the facilitator is passive</td>
</tr>
<tr>
<td>Requires improving communication skills</td>
<td>Preparation required</td>
</tr>
<tr>
<td>Inquiry based instruction</td>
<td>Increased SDL and listening</td>
</tr>
<tr>
<td>Multiple facilitators needed for large course</td>
<td>May only be a segment of a case</td>
</tr>
<tr>
<td>Uses real life scenarios or challenges</td>
<td>Timeframes</td>
</tr>
<tr>
<td></td>
<td>Desired outcomes</td>
</tr>
<tr>
<td></td>
<td>No roleplaying</td>
</tr>
</tbody>
</table>
Mock PBL

• Each group conducts a mock session

• Roles are assigned to each participant
  – Tutor
  – Discussion Leader
  – Scribe
  – participants

• Problem-based case is given to group at start of session

• Sharon & Susan will observe & assist if needed
Team-Based Learning

Definition

• “a special form of small group learning using a specific sequence of individual work, group work and immediate feedback to create a motivational framework that hold students accountable for being prepared” (Sweet, 2010)

• Differs from other small group work because it involves developing and using teams
Tuckman’s Stages of Team Formation

**Forming**
- Team members meet each other
- Team members learn about the task
- All team members learn what their roles will be
- Leader focuses the team

**Storming**
- Team members learn how to work together
- Team members learn about other member’s abilities
- Leader focuses the team

**Norming**
- Team starts to work and act together
- Roles evolve into helping the team succeed
- Team members are more likely to express opinions

**Performing**
- Team members work hard toward goal
- Members are flexible and help each other
- Leader’s role is blurred - everyone is focused
Steps of TBL

1. Preparatory Materials
2. Completion of the iRAT
3. Completion of the gRAT
4. Appeals Process
5. Mini-Lecture
Method of instruction for achieving student applied knowledge/competence, through –

• Primary learning objectives: Application of concepts
• **Cohesive Learning Groups**: Constituted to maximize diversity within groups and “equal" distribution of resources
• Teacher role: Design/manage instruction
• Student role: Read independently & work collaboratively in groups
• **Assignments**: Promote learning & team development, by requiring group interaction
• **Feedback**: Frequent/timely
• **Accountability**: Assessment/grading supports learning in groups – through accountability for quality of individual and group work; preparation; attendance; contribution to group effort
## TBL using Bloom

<table>
<thead>
<tr>
<th>Levels</th>
<th>iRAT</th>
<th>gRAT</th>
<th>Application Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyzing</td>
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<tr>
<td>Applying</td>
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<td>Understanding</td>
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</tr>
<tr>
<td>Remembering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Similarities to PBL</td>
<td>Differences from PBL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Strategies, Not Teaching Technique</td>
<td>Teaches how to apply information previously studied not how to learn new material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In class small group work</td>
<td>Reliance on facilitators to keep teams functioning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only one group facilitator is needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occurs for the length of the course</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mock TBL

• CMSRU TBL Video
• Mock TBL to follow
  – iRAT - each participant completes an iRAT
    • Collected upon completion
  – gRAT - each group completes a gRAT
  – iFAT – once each group agrees on answers
  – Large group review of answers
Active Learning Methods

Assessment

- Participation
  - CBL – goal of critical thinking; peer learning; guided inquiry
  - PBL – goal of critical thinking; change in thought process; self-guided inquiry

- TBL
  - gRAT score
## Sample Case-Based Session Assessment

<table>
<thead>
<tr>
<th></th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preparation</strong></td>
<td>Every session fully prepared</td>
<td>Prepared for most sessions; multiple comments/sources</td>
<td>Basic preparation; defines vocabulary; 1 or 2 sources</td>
<td>Inconsistent preparation; at times unable to define basic vocabulary</td>
<td>Rarely/never prepared</td>
</tr>
<tr>
<td><strong>Participation</strong></td>
<td>Consistently contributes w/worthwhile comments</td>
<td>Contributes 1 or 2 worthwhile comments</td>
<td>Contributes with prompting</td>
<td>Rarely contributes even with prompting</td>
<td>Does not contribute.</td>
</tr>
<tr>
<td><strong>Completion of Case Objectives</strong></td>
<td>Identifies learning issues related to case; helps group focus on critical points</td>
<td>Identifies learning issues related to case; shares info with group</td>
<td>Identifies at least 1 learning issues related to case and shares some info with group</td>
<td>Seldom identifies learning issues relevant to case</td>
<td>Does not identify learning issues relevant to case.</td>
</tr>
<tr>
<td><strong>Teamwork</strong></td>
<td>Actively supports, engages &amp; shares w/group</td>
<td>Makes clear &amp; sincere effort to interact in group learning</td>
<td>Does not significantly add to group dynamic &amp; discussion</td>
<td>Limited interaction with peers; occasionally disruptive</td>
<td>Virtually no interaction with peers; group discussion disrupted</td>
</tr>
</tbody>
</table>
## Sample Course Assessment

### Contribution of Active Learning

<table>
<thead>
<tr>
<th>Activity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written Examination</td>
<td>57%</td>
</tr>
<tr>
<td>*Team-Based Learning</td>
<td>3%</td>
</tr>
<tr>
<td>Practical Examination</td>
<td>40%</td>
</tr>
<tr>
<td>*Active Learning Group (Case-Based)</td>
<td>Average of 3 or more</td>
</tr>
</tbody>
</table>
Learning Objectives

- Demonstrate an understanding of active learning and group facilitation.
- Discriminate between the three established models of active learning.
- Explore the application of active learning methods in medical education and information literacy instruction.
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Questions???

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