Problem-Based Learning

Erica L. Suchman, Ph.D.
Associate Professor; Virology, Arboviruses
Craig Spooner
ACCESS Project Coordinator

What is PBL?

- Problem-Based Learning is...
  - "a student-centered instructional strategy in which students collaboratively solve problems and reflect on their experiences."¹
  - "focused experiential learning, organized around the investigation and resolution of messy, real-world problems."²

  ¹ http://en.wikipedia.org/wiki/Problem-based_learning
  ² http://pbln.imsa.edu/model/intro/index.html

History

- McMaster University in Ontario, Canada (1965)
  - "goal of improving students' ability to apply knowledge in clinical contexts, increase retention of information, and develop lifelong learning habits."³

- Popular at many schools of medicine and public health
  - Univ. of Delaware
  - Univ. of New Mexico
  - Drexel University
  - Harvard School of Dental Medicine
  - Others...

  ³ http://en.wikipedia.org/wiki/Problem-based_learning
Key Concepts

- PBL is student-centered, active and engaging
- Learning is driven by challenging, open-ended problems
- Students work collaboratively to solve problems and reflect on their learning experiences
- Content is introduced in the context of real-world, complex problems
- Emphasizes exploration, questioning and reflection (critical thinking)
- Emphasizes process, not answers

Research

- At Harvard School of Dental Medicine, PBL students did significantly better than non-PBL students in the areas of:
  - Communication with patients
  - Critical thinking
  - Independent learning
  - Performance in small group settings
  - Self-assessment
  - Teamwork


Instructor’s Role

- As students assume more responsibility for their learning, instructor becomes a facilitator
- Getting started
  - Begin w/ worked examples
  - Model how to solve problems
  - Instructor support is faded as soon as possible
What do you think are the pros and cons of using PBL with your students?

### Instructor’s perspective
- "I like seeing my students more engaged."
- "I am preparing students for the real world."
- "Students understand the material at a deeper level."

### Students’ perspective
- "PBL is time-consuming; I can’t cover as much material."
- "I worry about losing control of my class."
- "Students may not be the best teachers."
- "I am no longer the ‘sage on the stage.’"

### The Instructor

#### Pros
- "I like seeing my students more engaged."
- "I am preparing students for the real world."
- "Students understand the material at a deeper level."

#### Cons
- "PBL is time-consuming; I can’t cover as much material."
- "I worry about losing control of my class."
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### The Students

#### Pros
- "The problems we work on feel real and relevant."
- "I remember more when I work through a problem from start to finish."
- "I can see how the topics in this course are connected."

#### Cons
- "I don’t think the instructor is doing his/her job; the students are doing all the work!"
- "Just tell me what I have to memorize for the exam!"
- "I hate getting stuck in a deadbeat group!"
Erica’s evolving use of PBL

- Group exams are designed to make students use the material & critical thinking to solve problems.
- Group exams are designed to be too difficult to answer during one class period.
- Students are told the types of questions asked on the group exams will be used on their individual exams.

- Students are given the exams 1 week before they are to take them.
- They are told they are expected to work on these outside of class, & that they will not be able to finish them if they come to class unprepared.
- They have 35 minutes, the last 15 minutes of class we go over the answers.

- On the day of the exam the group decides on the best answer, fills out an answer sheet & turns it in for a group score. Students may fill in a page of dissent.
- If the dissenter is correct only they will get the points, if they are wrong only they will lose points.
- Students must be present during the group exam to get credit. I verify the presence of students during the exam, helps me to learn their names.
- The last 15 minutes of class the students develop the key by answering questions about the group exam using their clickers.
Erica’s evolving use of PBL

1. Determining the identity of field isolated organism based on their characteristics: comparing eubacteria, archa, & eukaryotes; classification.
2. Metabolism & bioremediation
3. Transcription, translation and mutations
4. Viral life cycles and anti-viral drugs

PBL and UDL

1. Ideas and information are represented in multiple ways
   - Learning is driven by challenging, open-ended problems
   - Students assume more responsibility, instructor becomes facilitator
   - Emphasizes process, not answers
2. Students express comprehension in multiple ways
   - Students work collaboratively to solve problems and reflect on their learning experiences
   - Individual and group assessments
   - Team members can play multiple roles
3. Multiple opportunities for engagement
   - PBL is student-centered, active and engaging
   - Content is introduced in the context of real-world, complex problems
   - Exploration, questioning and reflection (critical thinking)

Recommendations for PBL Implementation

- Ask yourself:
  - What are your reasons for implementing PBL?
  - What do you expect your students to gain?
  - What works and what doesn’t in your current teaching approach?
  - Will you switch entirely to PBL or adopt a hybrid approach?
  - What makes for a good PBL instructor?
  - Are you clear about students’ responsibilities and your expectations using PBL?
Next Time...

- Universal Design for Learning as applied to course materials and technology
  - Microsoft Word
  - Adobe PDF
  - HTML

Thank you!