Problem-Based Learning

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Content

What is problem-based learning (PBL)?

Personal/College of Pharmacy PBL experiences

What are the advantages/challenges of PBL?

How can faculty design PBL activities?

How can faculty facilitate PBL activities?

How can faculty evaluate PBL activities?

What PBL resources to recommend?
What is Problem-Based Learning (PBL)?

- A teaching method that is problem-driven and student-centered
  - Ill-structured real world problem is solved by small group of students in the presence of a facilitator/tutor
  - Students are responsible for learning and work together with others to solve problems
  - Students identify known and unknown information in order to solve problem
  - Unknown information are researched using evaluated resources

History of PBL

♦ First developed by medical faculty at Case Western Reserve University in the late 1950s

♦ Further developed by medical faculty at McMaster University in Canada

♦ PBL now used in many medical schools, pharmacy schools; other disciplines: law, business, architecture, mechanical and civil engineering, political science, social work, forestry, K-12 curricula
Traditional Learning

- Told what we need to know
- Memorize it
- Problem assigned to illustrate how to use it

Problem Based Learning (PBL)

- Problem assigned
- Identify what we need to know
- Learn and apply it to solve the problem
PBL: Why it works?

- Increase students’ learning, integration, synthesis, and retention of information
- Increase students’ clinical reasoning skills, self-directed learning, and overall, life long learning skills
- Improve students’ interpersonal skill and teamwork
- Enhance students’ motivation to learn
- Increase students’ level of learning, problem-solving skills, self-evaluation techniques, and data gathering skills
PBL Learning Outcomes

- Useable, relevant knowledge
- Clinical reasoning and problem solving skills
- Life-long, self-directed learning
- Effective teamwork skills
PBL Process

Stage 1 - Group Setting
Stage 2 - Problem Identification
Stage 3 - Idea Generation
Stage 4 - Learning Issues
Stage 5 - Self-directed Learning
Stage 6 - Synthesis & Application
Stage 7 - Reflection & Feedback

The problem drives the learning
Components of PBL

- Problems
- Student role (scribe, reader, leader)
- Facilitator/Tutor role
- Learning Issues
- Oral/Written presentations
- Self Assessment
- Peer Assessment
- Facilitator Assessment
### The Right Problem

<table>
<thead>
<tr>
<th>Well-structured</th>
<th>Ill-structured</th>
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</thead>
<tbody>
<tr>
<td>✦ What are the roles of a pharmacist in nuclear pharmacy?</td>
<td>✦ “Euthanasia: Allowing dignity or committing a sin?”</td>
</tr>
<tr>
<td>✦ What are the profit potentials for a lawn service business?</td>
<td>✦ “As the supervisor, you have noticed there has been a significant amount of absences in the women who work in your department.”</td>
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Examples of Learning Issues

♦ Mechanism for diabetic nephropathy
♦ Pharmacological options for diabetic nephropathy
♦ Goal of therapy of diabetic nephropathy
♦ Blood pressure goal for patients with diabetic nephropathy
♦ Non-pharmacological options for diabetic nephropathy
PBL Scribe Chart

- Important facts
- What you need to know
- Hypothesis
- Learning issues
PBL experiences

- Personal
- HU College of Pharmacy Courses
“Educating the Best Pharmacists in the World”
Pharmacy Curriculum

“The development of critical thinking and problem-solving skills through active learning strategies and other high level pedagogical strategies should be supported throughout the curriculum.”

“Provide patient care in cooperation with patients, prescribers, and other members of an inter-professional health care team.....”
In order to educate best pharmacists in the world:

Bloom’s Taxonomy

Course name: Team Building/PBL in P1 year

Course is supportive of all other coursework as it seeks to develop independent learners by using teamwork concepts and student-centered learning methodology.
Problem-Based Learning Activities

- Full PBL
  - Teams of 6-8 students
  - Use of small group space
  - Use of trained peers (4th year students)
  - Over three sessions
  - Use of case on topic that students have no prior knowledge*
  - Case is progressively disclosed
  - Learning issues drive learning
  - Student do research independently
  - Facilitator/tutor assessment
PBL Implementation Challenges at HU College of Pharmacy

- Resources
  - Facilitators
  - Finances
  - Physical facility
  - Case development
  - Overall PBL management
Modified PBL in College of Pharmacy

In all Integrated Therapeutics Laboratory courses (P2 and P3 years)
Lecture-based method

Cases are used to reinforce and ensure student understanding post-lecture.
Case-based method

Cases or case vignettes are presented before lectures to stimulate student learning.
Case method: Students receive a case for research prior to class discussion.
Modified PBL

- Facilitator (present or absent) in small group setting
- Students have prior knowledge (not always)
- Case questions drive student learning
- Designed for reinforcement and knowledge application
Closed-loop problem based

At end of self-study, students regroup to evaluate used resources and re-analyze problem using newly acquired knowledge.
Faculty Perspectives: Integrated Therapeutics Laboratory

PBL Method Use by Pharmacy Faculty

- Lecture-based
- Case-based
- Case method
- Modified case-based
- Problem-based
- Closed-loop problem based

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014
Faculty Perspectives: Challenges faced in incorporating PBL

- Developing the problem/case
- Not enough manpower
- Consistent use of PBL methods by all faculty would improve efforts to get consistent performance and results from students
- Tendency to split the cases among the students in the same group
- Having a better understanding of how to incorporate PBL
- Time
- Time, case validation process
- Time constraints
- Time constraints
Students’ Perspectives

Class Participation

- Class of 2014: 30.95%
- Class of 2015: 69.05%

Survey conducted by PharmD candidates: Chioma Esoga and BUKy Oriola, January 2014
Students’ Perspectives

PBL Incorporation in IT Lab Courses

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014
Students’ Perspectives

PBL Method Use by Students

- Lecture-based: 5.29
- Case-based: 8.1
- Case method: 5.05
- Modified case-based: 6.17

Survey conducted by PharmD candidates: Chioma Esoga and Boky Oriola, January 2014
Students’ Perspectives

PBL Enhancing Learning Skills

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014
Students’ Perspectives: Advantages of PBL

- Learning to work in groups problem solving
- Helps you apply your knowledge to a real life situation. Helps understand information presented by seeing how it’s used.
- Hands on learning experience and easier to remember information
- Allows for educated interaction between colleagues, exchange of ideas and thought processes.
- Increase students confidence and critical thinking
- It creates room for team work.

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014
Students’ Perspectives: Advantages of PBL

- It enables students to pull resources together
- Gives practice for handling real life patient cases
- It encourages critical thinking. It helps to make connections with disease states
- Get to think with a clinical based mind set. Allows us to apply our acquired knowledge from IT lectures and implement it in understanding lab cases.
- Gives you the chance to apply what we've learned in class - allows us to ask questions to what we'll actually see in a clinical setting
Students’ Perspectives: Challenges of PBL

- Doesn't do value when it’s done before the lecture is given and we're not really taught how to tackle some of these cases, we're just given the case and are expected to know what to do.

- Time consuming and some people don't know how to work in groups.

- Sometimes I felt dominated over to speak during pbl people that are more outspoken got more out of the experience in my opinion.

- Use of Time. Facilitators to give feedback.

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014
Students’ Perspectives: Challenges of PBL

- Sometimes cases are too advanced and have too many other aspects when you are a P2 and the cases can be overwhelming.
- Not full participation of the group. Different styles and methods of PBL.
- There might not be enough time between lecture and lab for PBL to be effective, or we haven't had lecture yet and we are lost.
- Lack of direction.
- Voices and thoughts may not be heard; all options may not be explored using professor based cues only.
- If the case is given before the lecture and if the case is not clear.
- Some students might hide under the umbrella of others and there might be conflicts as some students may not like to work with others.
- Students might not really be able to fully understand the material.

Survey conducted by PharmD candidates: Chioma Esoga and Buky Oriola, January 2014.
In Summary: PBL Advantages

- Problem solving skills
- Critically thinking skills
- Self-directed learning
- Collaborative working skills
- Student motivation
- Research skills
- Verbal and written communication skills
In Summary: PBL Challenges

- Creating the “right” case
- Preparation time
- Availability of facilitators
- Financial
- Physical facility
- Consistency among facilitators
- Group dynamics
- Fulfillment of learning objectives

How can faculty design PBL activities?

- Determine the skills for students to learn
- Identify learning objectives
- How much time to dedicate to PBL activity
- Determine type of PBL design to use
- Project needed resources (space, facilitators, training of facilitators, case prep time, etc)
  - Use resources of existing cases (alternative)

Barrows, HS. A taxonomy of problem-based learning methods.
How can faculty facilitate PBL activities? Role of Facilitators

♦ Guide for direction
♦ Serve as resource
♦ Ensure learning objectives are met
♦ Facilitate effective group dynamic
♦ Provide assessment
How can faculty facilitate PBL activities? The Process

- Clarify and define problem
- Develop hypotheses/explanations
- Identify knowledge known and learning issues
- Learning issues are distributed
- Identify appropriate learning resources
- Research new knowledge and information
- Communicate new knowledge and information
- Synthesize and apply old and new information to problem
- Identify issues not learned
- Summarize knowledge and connect new to old concepts
How can faculty facilitate PBL activities? Strategies

- Open ended and metacognitive questions
- Probe for explanations
- Restating
- Summarize

Hmelo-Silver CE, Barrows HS. Goals and strategies of a PBL facilitator. 2006
Sample Questions

- Let’s collect ideas about this.
- Any other ideas?
- Why is that? How come?
- Do you agree with what was just said?
- How do you know that?
- What assumptions are you making?
- What are some concrete examples?
- Where does the new information lead?
- How is this related to other information?
How can faculty evaluate PBL activities?

- Problem summary write up
- Problem-based content exam
- Self assessment
- Peer assessment
- Facilitator assessment
- PBL activity evaluation

What PBL resources to recommend?

✦ The Interdisciplinary Journal of Problem-based Learning. [http://docs.lib.purdue.edu/ijpbl/](http://docs.lib.purdue.edu/ijpbl/)

✦ PBL Problem Development Websites
  ✦ McMaster University, [http://www.fhs.mcmaster.ca/pbls/writing/index.htm](http://www.fhs.mcmaster.ca/pbls/writing/index.htm)
  ✦ University of Delaware, [http://www.udel.edu/pbl/problems/](http://www.udel.edu/pbl/problems/)