

Problem-Based Learning: Models for Implementation



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What Is PBL?

“The principal idea behind PBL is that the starting point for learning should be a problem, a query, or a puzzle that the learner wishes to solve.”

Boud, D. (1985) PBL in perspective. In “PBL in Education for the Professions,” D. J. Boud (ed); p. 13.



Medical School Model

Dedicated faculty tutor
Groups of 8-10
Very student-centered environment
Group discussion is primary class activity

A good choice for:

Highly motivated, experienced learners
Small, upper-level seminar classes



Typical Medical School PBL Problem: High Degree of Authenticity

Patient arrives at hospital, ER, physician’s office presenting with symptoms X, Y, Z

What questions should you ask?

What tests should you order?

Physician interviews patient, receives results of tests

Differential diagnosis

Preferred therapy

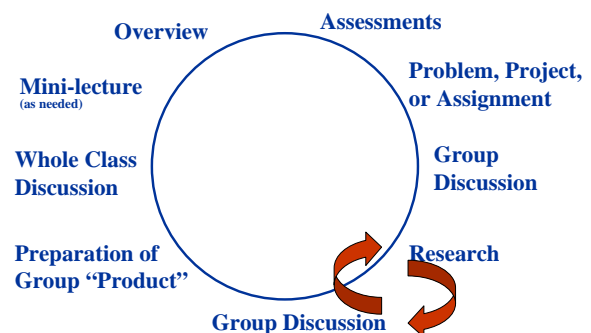


“Hybrid” PBL

Non-exclusive use of problem-driven learning in a class
May include separate lecture segments or other active-learning components
Floating or peer facilitator models common

Often used as entry point into PBL in course transformation process

The Problem-Based Learning Cycle – Hybrid Model





Introductory Biology – An Example for Small Enrollment Courses

Course is one section of multi-section 2-semester survey course for science and allied health majors

6-7 PBL problems per semester

Session time ranges from 75 - 120 min.

PBL activities comprise 85-90% of total course time

4-5 student groups of up to 6 students

1 peer facilitator (junior or senior) per group

(same model also used in upper division bio course)



General Chemistry: An Example of a Hybrid Model

Problem-based group work	40%
Lecture/whole-class discussion	50%
Demonstrations	7%
Other (Exam, lab review)	3%

Source: Susan Groh, Ph. D., Department of Chemistry & Biochemistry, University of Delaware



Overview of Additional Models

Biology

4 problems per semester (2 ½ periods each)

2 lecture days, 1 PBL day per week

Criminal Justice

1 two-week problem on important course content

Many courses

PBL activities in discussion, lab



Common Strategies for Monitoring Groups

- **Set the stage early**
- **Form heterogeneous groups**
- **Use permanent groups**
- **Rotate roles of responsibility**
- **Rely on group-selected ground rules**
- **Conduct peer evaluations**



Question for Groups

Reflect on this morning's experience, or on prior experience with PBL:

What role do instructors play in a PBL course?

Be prepared to report out in 5-10 min.



PBL Models for Undergraduate Courses

Medical School Model

Small class, one instructor to 8-10 students

Floating Facilitator Model

Small to medium class, one instructor, up to ~75 students

Peer Facilitator Model

Small to large class, one instructor and several peer facilitators

Large Class Models

Floating facilitator and hybrid PBL/other activities



Peer Facilitator Model

Advanced undergraduates serve as facilitators

*Help monitor group progress and dynamics
Serve as role models for novice learners
Capstone experience for facilitator*

Instructor's role

*Gives orienting lectures
Leads whole class discussions
Works with facilitators behind the scenes*



Strategies Typically Used to Teach A PBL Problem

- 1) "Mini" lecture to introduce problem
- 2) Instructor provided input at regular intervals
- 3) Mechanism for groups to compare notes
- 4) Instructor circulated amongst the groups
- 5) Instructor provided some resources
- 6) Problem constructed to allow for 1-5
- 7) Problem constructed to provide learner prompts for PBL novices



Good PBL Problems...

Relate to real world, motivate students
Require decision-making or judgments
Are multi-page, multi-stage
Are designed for group-solving
Pose open-ended initial questions that encourage discussion
Incorporate course content objectives, higher order thinking, other skills



But...where are the problems?

Typical end-of-chapter problems can be solved by rote memorization, pattern-match, and plug-and-chug techniques
Good problems should require students to make assumptions and estimates, develop models, and work through the model.
A source of problems outside the commercial texts needs to be developed.



PBL Clearinghouse

An online database of PBL articles and problems.
All material is peer-reviewed by PBL practitioners for content and pedagogy.
All problems are supported by learning objectives and resources, teaching and assessment notes.
Holdings are searchable by author, discipline, keywords, or full text.
Fully electronic submission, review, and publication cycle.
Controlled access by free user subscription, students excluded.



UD PBL Online

PBL at UD - www.udel.edu/pbl
Sample PBL materials, including syllabuses; links to other sites

PBL Clearinghouse - www.udel.edu/pblc
Database of peer-reviewed PBL problems

ITUE - www.udel.edu/inst
Workshops on PBL and integration of technology, communication skills

Lilly-East 2007 material:
www.udel.edu/pbl/lillyeast2007