

Models for Problem-Based Learning in Small, Medium and Large Classes



*Institute for Transforming
Undergraduate Education*

University of Delaware



PBL2002: A Pathway to Better Learning

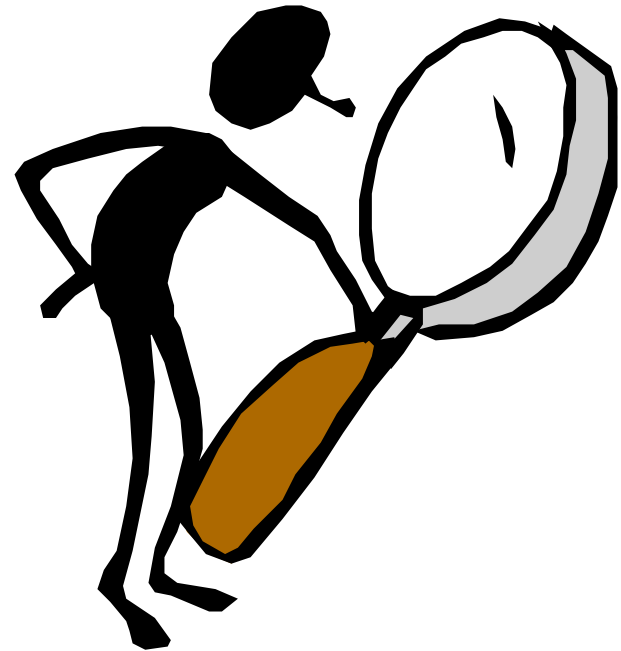
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Discussion

Think about a course in which you would like to use or are using PBL.

What barriers do you anticipate or have you encountered in structuring that course?





Factors in Choosing a Model

Class size

Intellectual maturity of students

Student motivation

Course learning objectives

Instructor's preferences

Availability of peer facilitators



Medical School Model

Dedicated faculty tutor

Groups of 8-10

Very student-centered

Group discussion is primary class activity

A good choice for

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



Floating Facilitator Model

Instructor moves from group to group

- **Asks questions**
- **Directs discussions**
- **Checks understanding**

Group size: 4

**More structured format: greater degree
of instructor input into learning issues
and resources**



Floating Facilitator Model

Class activities besides group discussions:

- **Groups report out**
- **Whole class discussions**
- **Mini-lectures**

A good choice for

- **Less experienced learners**
- **Small- to large-sized classes**



“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

Honors General Chemistry: Course Background



**First-year Honors students in life sciences,
engineering (non-majors): required course**

2-4 lecture sections (20 max)

MWF 50-minute lecture schedule

5-7 TA-led weekly 3-hr. lab sections (12-16)

Four to six groups of 4 ± 1 per section

.....Novice, less-motivated learners.....



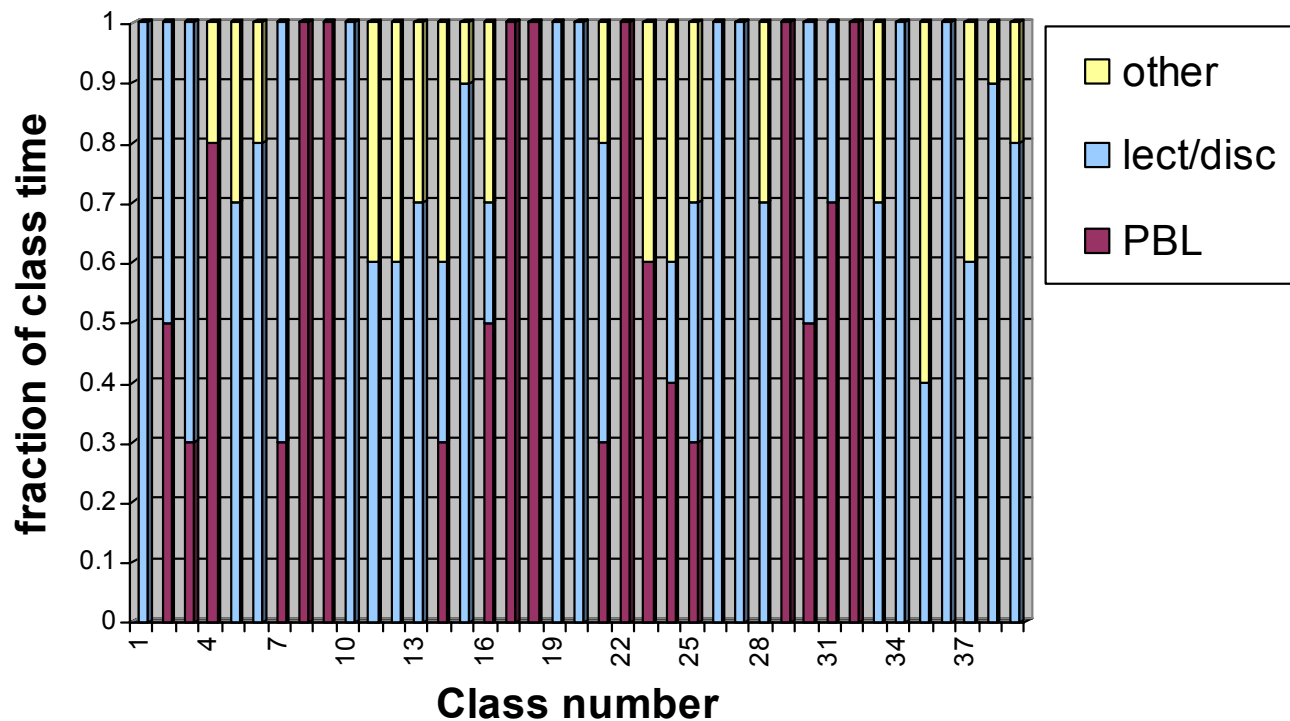
Honors General Chemistry: Course Format

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



How Class Time is Used

Class Time Allocation: CHEM 103H 01F





Honors General Chemistry: PBL Sequence

Problems introduce concepts prior to any discussion in class.

Guiding questions are used to focus learning.

Groups work in class (texts); meet to finish outside before next class meeting.

Group report out via overheads.

Summary sheets prepared from/based on reports

Problem followed by fuller discussion of related issues, connections to earlier work



Peer Facilitator Model

Advanced undergraduates serve as facilitators

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

A good choice for

- **Classes of all sizes**



Introduction to Biochemistry: Course Description

Heterogeneous groups of 4 discuss and work to understand about ten classic articles.

Articles presented in historical context, show the development of scientific understanding of protein structure and genetic disease.

Assignments and examinations emphasize conceptual understanding.

Instructor monitors progress, supervises tutors, presents demonstrations, and leads whole class discussions to summarize each article.



Introduction to Biochemistry: Administrative Details

3 Credits, No Laboratory, 8:00 AM MWF

Theme - Hemoglobin and Sickle Cell Anemia

Research articles used as PBL problems

First Biochemistry Course for Sophomore Majors

Required for the Major

Taught in a PBL Classroom

Enrollment 20 - 35

Uses Juniors and Seniors as Group Facilitators



PBL Classroom





Introduction to Biochemistry: Evolution of the Course

- 1970's** **Non-science majors course based on Herman Epstein's model**
- 1989** **Modified course required in new Biochemistry curriculum**
- 1993** **PBL first used**
- 1996** **Peer Facilitators first used**



Dealing with Large Classes

Floating facilitator or peer facilitator models are the most appropriate

Requires a more teacher-centered, structured format: instructor directs group activities

Group size: 4

Numbers advantage in dealing with group vs. individual papers, projects



Reflections and Questions

