

Problem-Based Learning: Getting Started



*Institute for Transforming
Undergraduate Education*

University of Delaware



PBL2002: A Pathway to Better Learning

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Ready, Set ...Go!

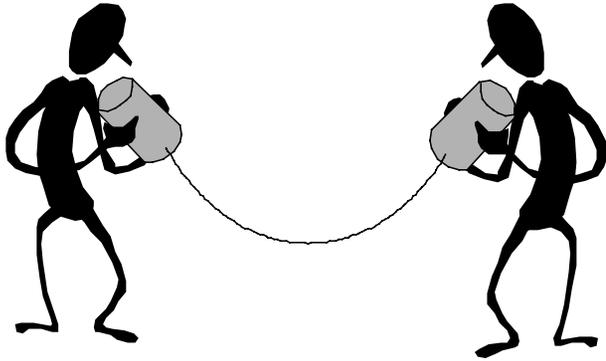
Getting ready: deciding on course goals and learning objectives

Getting set: documenting goals through the syllabus

Go!: the first week of class



Discussion: Describe Your Course



*Tell a neighbor about
your course...*

10 minutes total

- **What is its purpose?**
- **What ideas and concepts does it deal with?**
- **What about the course would you like to change? Why?**



Choosing Course Goals

What do you want your students to

- know
- be able to do
- value

as a result of taking this course?

Think on your own...5 minutes





Define Learning Objectives

List specific expectations and outcomes.

Consider a range of objectives.

- Overall objectives for course
- Objectives within specific unit/topic

Keep assessment in mind.

- How will you determine if objective has been met?



Types of Learning Objectives

Content-oriented: subject-specific

- **Understanding, application of specific concepts**
- **Correlation, integration of concepts**

Process-oriented: global skills

- **Effective communication: verbal and written**
- **Acquiring and evaluating information**
- **Working effectively with others**
- **Higher-order, critical thinking**



Selected Learning Objectives for...

Introduction to Biochemistry (Hal White)

- 1. Become intellectually independent learners**
- 3. Recognize and confront areas of personal ignorance**
- 4. Review and apply chemical principles in a biochemical context**
- 6. Create, understand, and value abstract biochemical models**
- 8. Discover and use the resources of the library and the Internet**
- 10. Gain confidence in the ability to read and understand scientific articles**
- 12. Appreciate the importance of clear oral and written communication**
- 13. Learn to organize logical arguments based on evidence**



Selected Learning Objectives for...

Clothing in Contemporary Society (Jane Lamb)

- **Examine how psychological, social, economic, and technological forces influence today's fashions**
- **Explain the role of different businesses in developing, producing, and distributing apparel products**
- **Depict how an apparel product moves from concept to design to production to distribution to consumer**
- **Judge value and quality of apparel products**
- **Develop skills for professional success (analytical thinking, communication, decision-making, teamwork).**



Selected Learning Objectives for...

CHEM 104H, Exam 2 (Susan Groh)

(More specific objectives for a given topic)

- **Be able to write the rate law for any elementary reaction**
- **Be able to predict the overall reaction and rate law expected for a given mechanism**
- **Know how to deal with intermediates in predicted rate laws**
- **Be able to evaluate potential mechanisms, given rate law data**
- **Be able to formulate simple mechanisms, given appropriate information**
- **Understand the role of a catalyst in the kinetics of a reaction**



Write Your Learning Objectives



- **Identify at least three learning objectives (overall or topic) for your PBL course**
- **Include both content and process objectives**

Work on your own or in teams...10-15 minutes



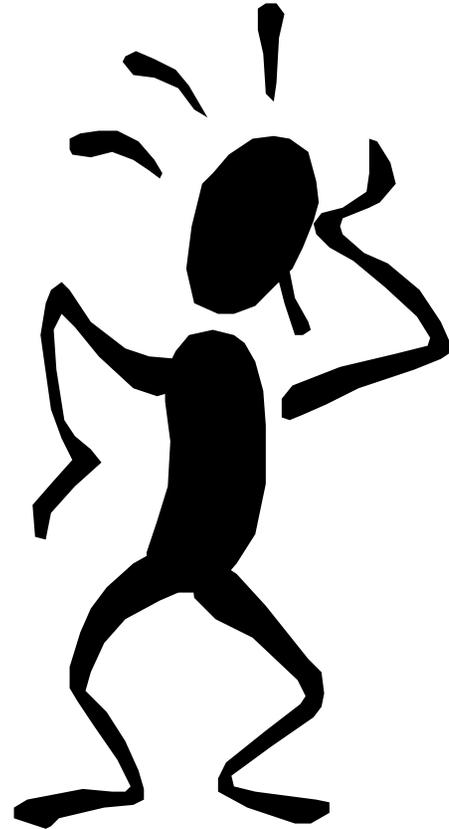
Typical Syllabus Contents

- **Course Information and Policies**
- **Instructor Information**
- **Text, Readings, Materials**
- **Course Calendar / Schedule**



Getting Set: The Syllabus

What aspects of your syllabus might/should change when you incorporate problem-based learning?





Changes Commonly Needed...

Meeting Place for Class

- Fixed seating vs. moveable seats; PBL or case study room option

Educational Philosophy

- Why PBL?
- Changing roles: student and faculty responsibilities
- Group work, roles, ground rules
- How? Idea of class format, “typical day”



Changes Commonly Needed...

Grading and Assessment

- Value of content knowledge/global skills
- Nature of assessment tools
- Individual and group accountability
- Attendance, participation
- Exam logistics: group components, extended time, scheduling

Other?



Go! The First Day

Tell me, I will forget

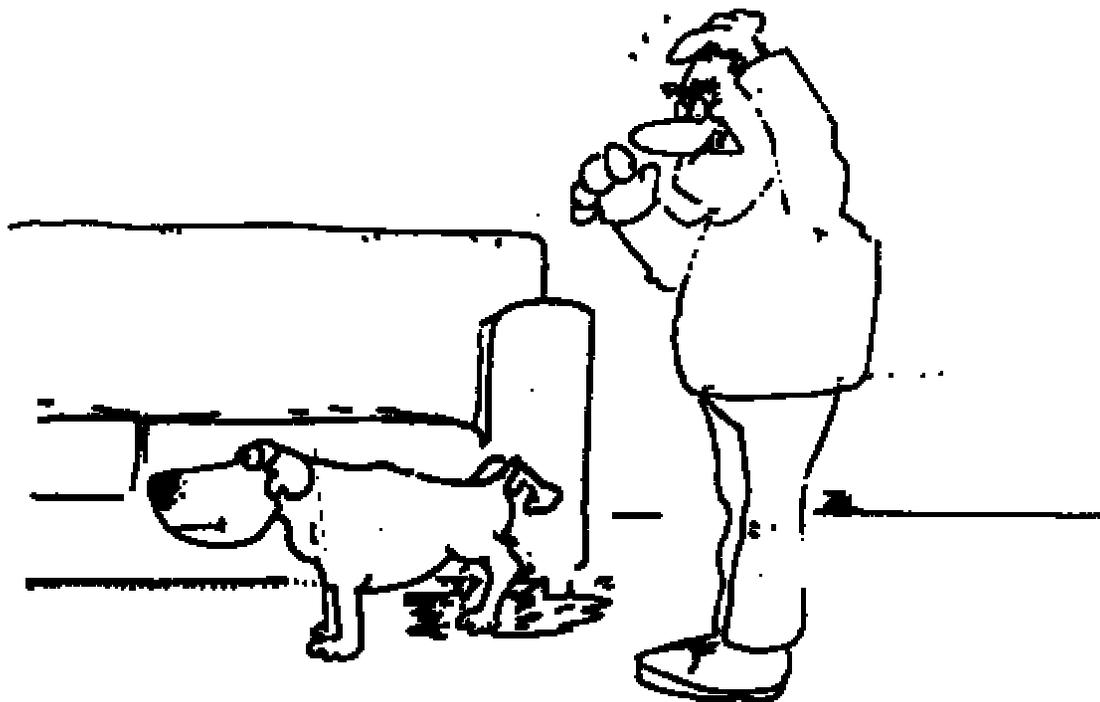
Show me, I may remember

Involve me, and I will understand

*Chinese Proverb as interpreted by Ei-Ichiro Ochiai,
J. Chem. Educ. 70:44 (1993)*

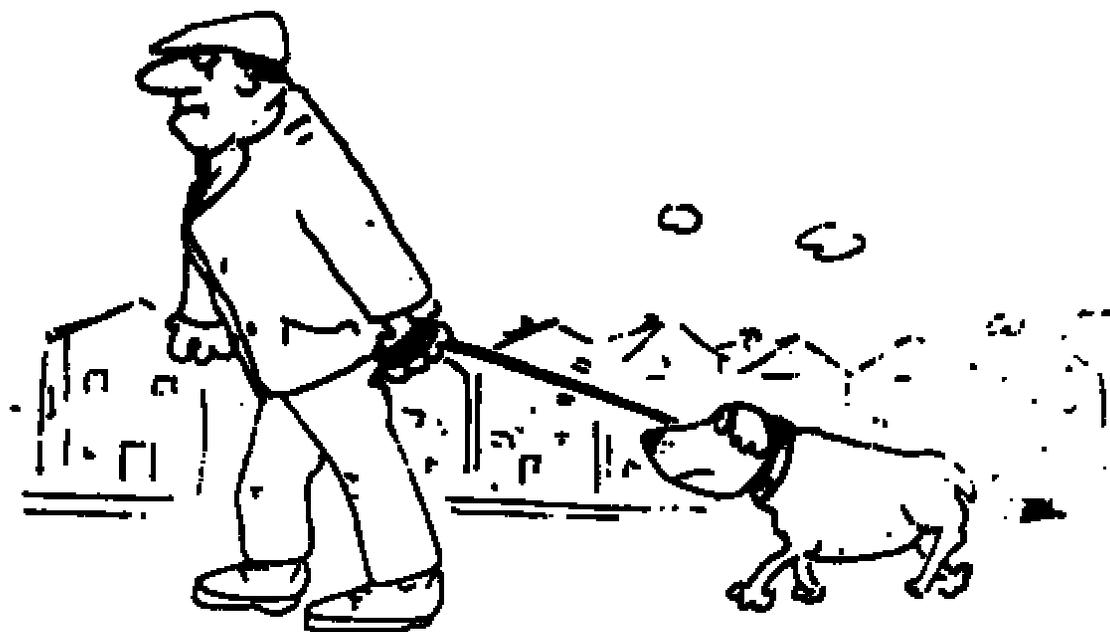


“Covering the Material”



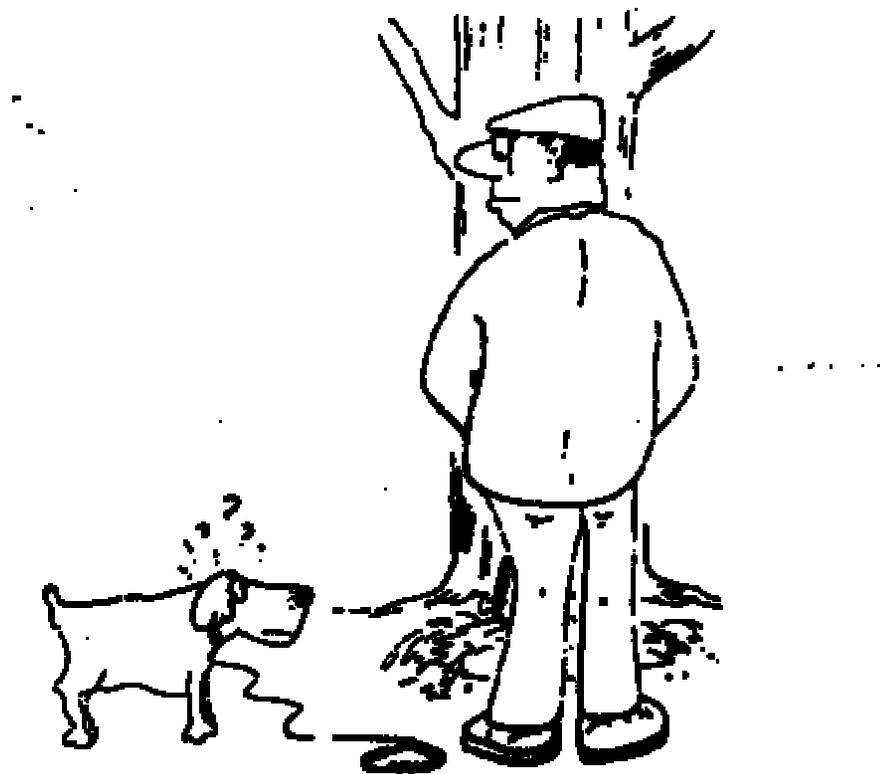


A New Lesson Plan Is Needed





Active Learning?



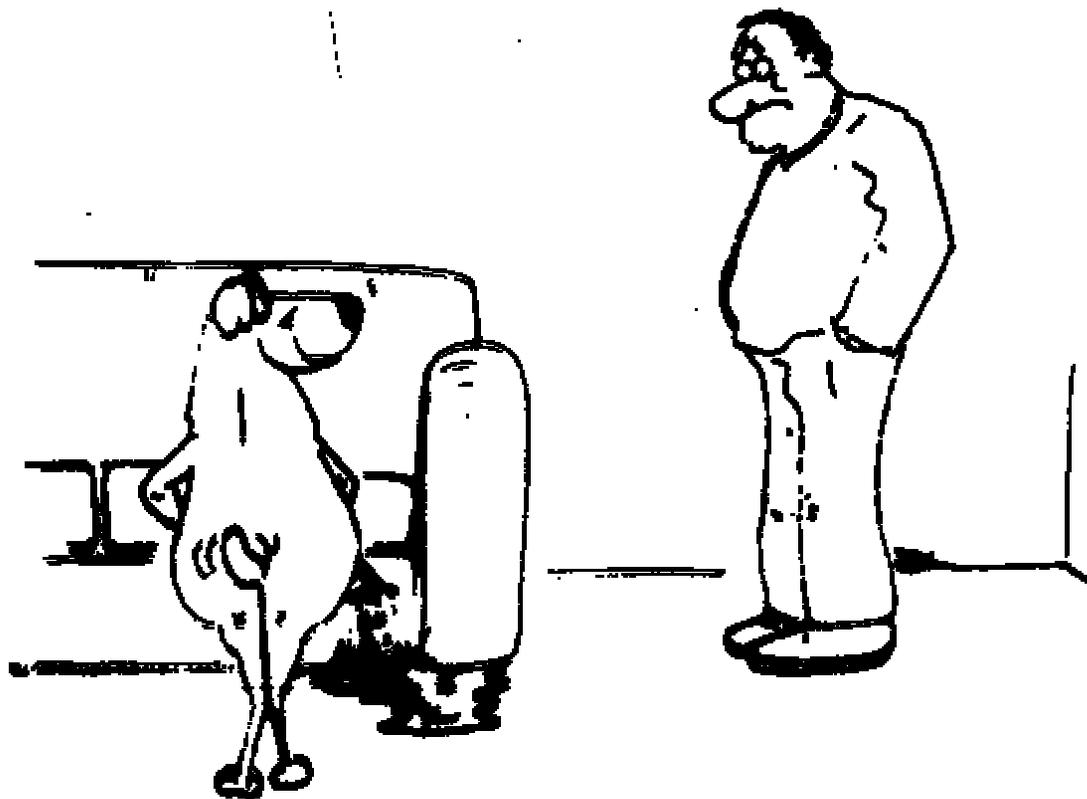


Mission Accomplished





Lesson Learned: Stand and Deliver



© John Garratt, *University Chemistry Education* 2(1), 29-33 (1998)



Stand and Deliver

1. Teacher Selection

The “teacher” is the group member who has a birth date closest to today’s date.

2. Lesson Plan

Teachers study a geometric figure they will describe orally to their “students”.



Stand and Deliver

3. The Lecture

Teachers describe to your students what you saw, as accurately as you can: 2-minute time limit.

NO GESTURES, NO QUESTIONS!

4. Teacher Conference

Teachers leave the room and discuss your lesson with one another.



Stand and Deliver

5. Individual Work

Students, *without talking*, draw a “carbon copy” of what your teacher described: 2 min.

6. Group Work

Students within groups, compare drawings, discuss, and develop consensus drawing: 5 min.



Stand and Deliver

7. Teacher Assessment

Teachers return and see what your students have drawn. Students discuss exercise with your teacher.



Stand and Deliver

8. Reflection

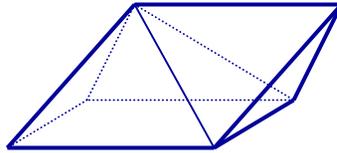
Did everyone in your group draw the same picture?

Did subsequent discussion improve the representation?

Was the teacher happy with the result?

What were your frustrations, if any?

Can you make any conclusions?





“Grading” This Assignment

Is there a “correct” answer?

How important are

- Shapes?**
- Relationships?**
- Orientation?**
- Size?**
- Position on Page?**