

# 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!

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**Getting ready:** deciding on course goals and learning objectives

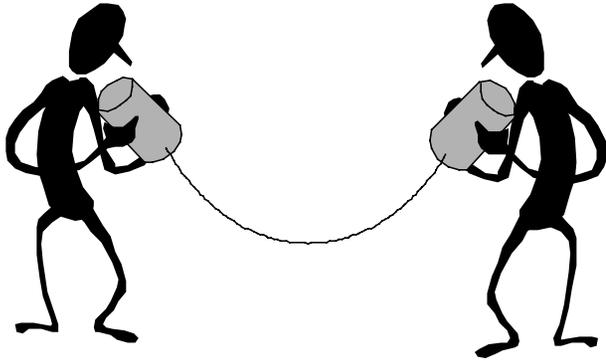
**Getting set:** documenting goals through the syllabus

**Go!:** the first week of class



# Discussion: Describe Your Course

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*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

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**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

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**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

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## **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...**

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## **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...**

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## **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...

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## **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

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- **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

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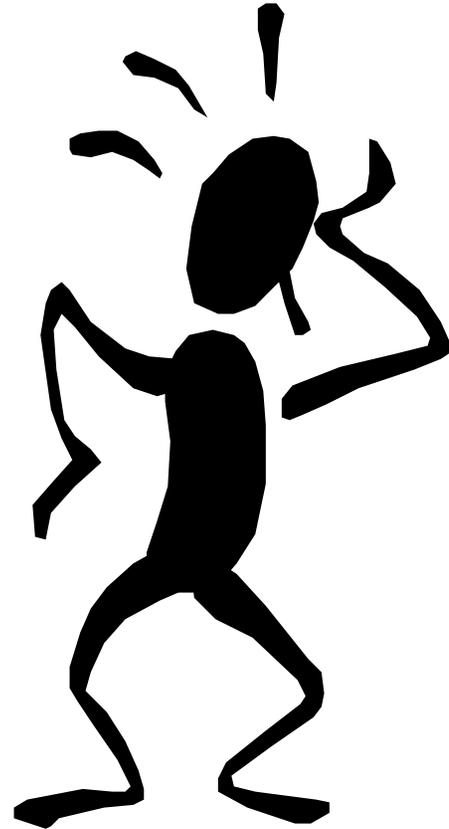
- **Course Information and Policies**
- **Instructor Information**
- **Text, Readings, Materials**
- **Course Calendar / Schedule**



# Getting Set: The Syllabus

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





# Changes Commonly Needed...

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## 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...

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## 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

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*Tell me, I will forget*

*Show me, I may remember*

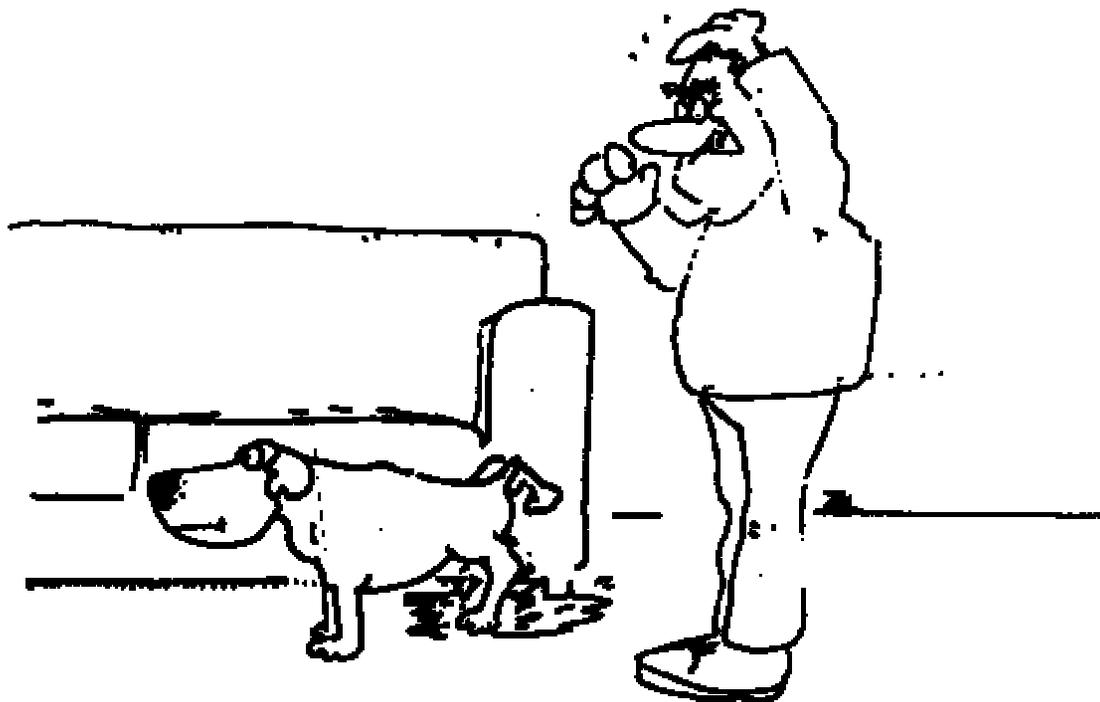
*Involve me, and I will understand*

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



# “Covering the Material”

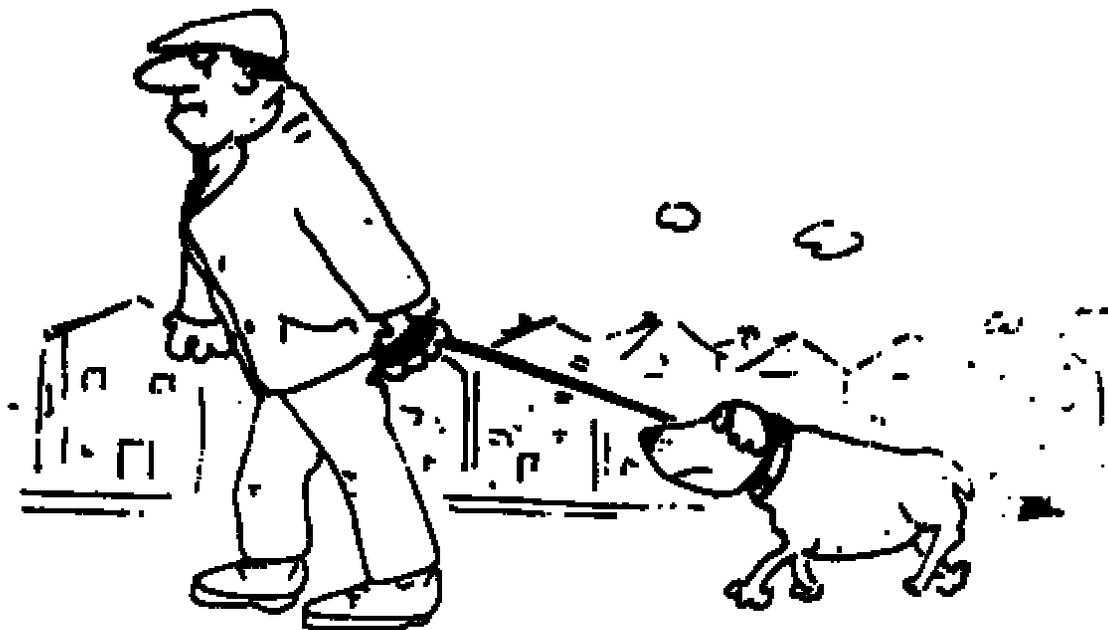
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# A New Lesson Plan Is Needed

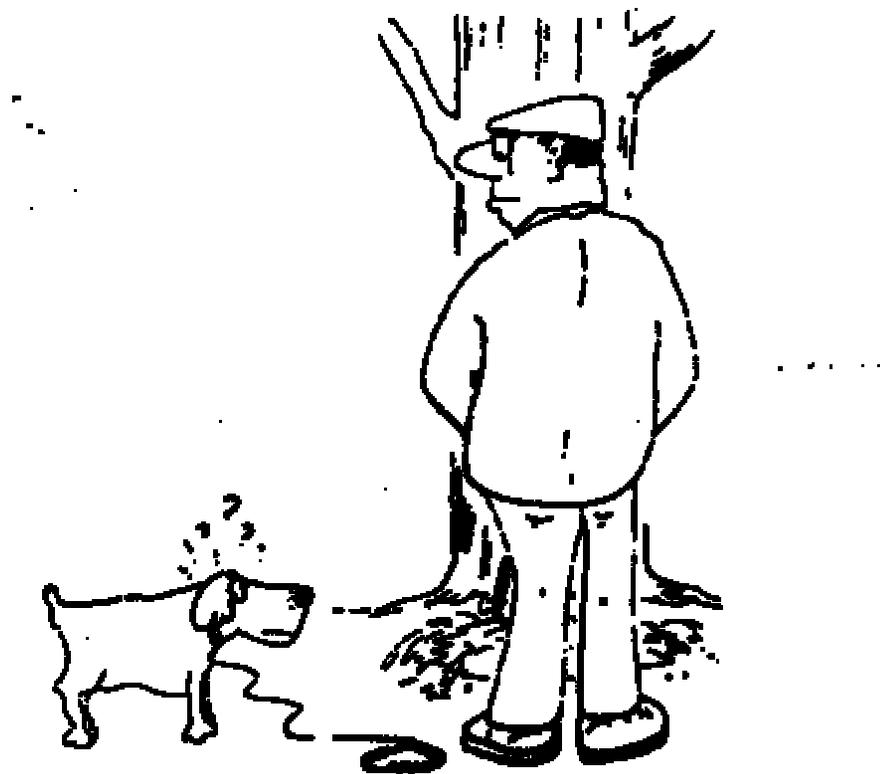
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# Active Learning?

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# Mission Accomplished

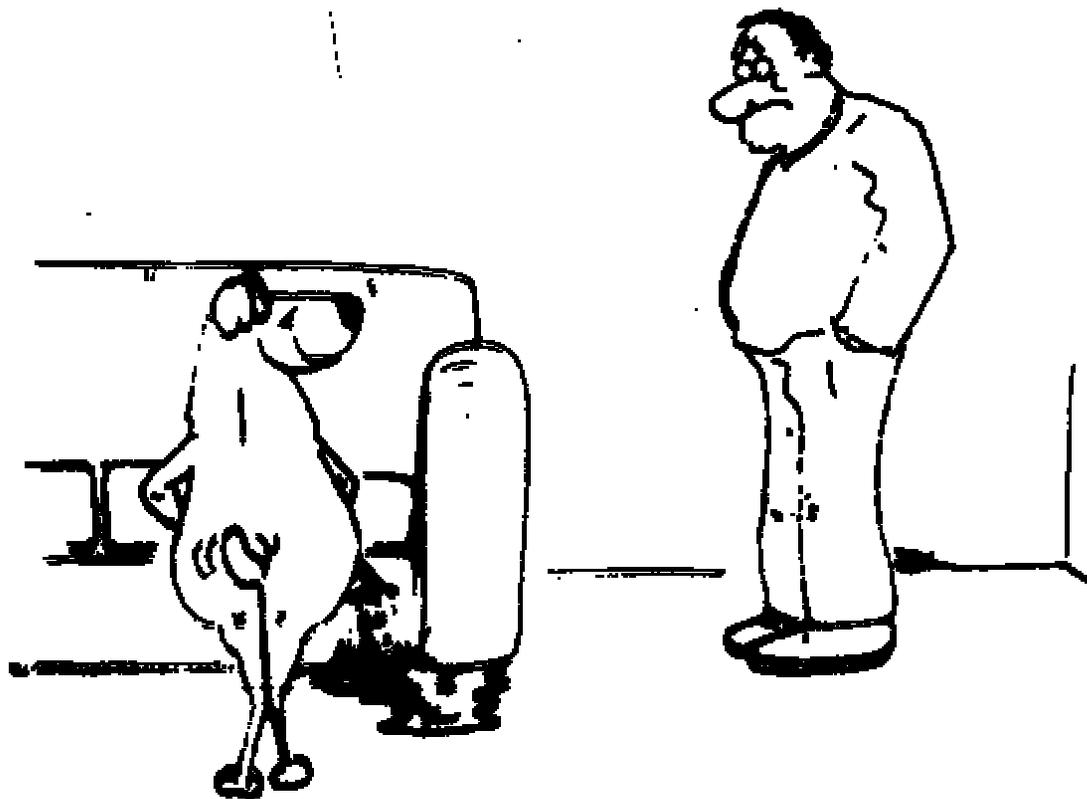
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# Lesson Learned: Stand and Deliver

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



# Stand and Deliver

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## 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

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## 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

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## 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

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## 7. Teacher Assessment

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



# Stand and Deliver

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## 8. Reflection

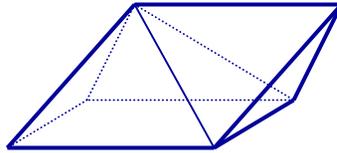
**Did everyone in your group draw the same picture?**

**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**

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**Is there a “correct” answer?**

**How important are**

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