

Rubric to Evaluate PBL Problems

Criteria	Descriptors			
		3 (ideal)	2	1
Realism		Based on an actual or fictionalized real-world situation linking topic to learner.	Contrived or contains unrealistic elements that decrease credibility.	Unrealistic, lacking relevant context.
Content		Addresses significant conceptual issues; directly related to major content goals.	Encourages superficial rather than in-depth understanding concepts.	Relevance of topic peripheral or not apparent.
Engagement		Stimulates discussion and inquiry through its relevance and presentation.	Generates limited or superficial discussion; provokes little curiosity.	Lacks a “hook”; obscure or pedantic presentation.
Complexity		Appropriately challenging; group effort and cooperation required; some ambiguity appropriate; integrates multiple concepts.	Difficult but may encourage a “divide and conquer” approach. Concepts not well integrated.	Solution accessible to most students working alone; focused on single concept.
Resolution		Open to multiple resolutions or multiple pathways to solution, depending on student assumptions and reasoned arguments.	Resolution is more obvious but allows reasonable opportunity for judgment and discussion.	One right answer is expected; limited opportunity for analysis and decision making.
Structure		Progressive disclosure via multiple stages, builds on existing student knowledge.	Staging does not flow well; transition could be improved.	Too much or too little information provided at once; short cuts thinking/research.
Questions		Limited in number, short, and open-ended; stimulate probing for deeper understanding.	Most are directive; preempt student-generated learning issues.	Lead to “yes-no” answers rather than thoughtful discussion.
Research		Promotes substantive research using multiple resources.	Research limited to textbook material.	Limited necessity for research.

Other possible rubrics:

Problem Delivery and Process

Associated Assignments

Student Products and Presentations

Writing Effective PBL Problems



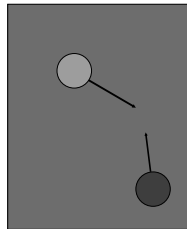
Courtesy of
Deborah Allen
University of Delaware



Example from Physics: Solving Problems Using Conservation of Momentum

Traditional examples:

- Pool balls colliding
- Bullets hitting blocks of wood



Types of Learning Objectives

Content-oriented: subject specific

- Basic knowledge and understanding of specific concepts, techniques, etc. in the discipline

Process-oriented: global skills

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



Step One: Identify Learning Objectives

Think of a learning objective in your course.

How do you usually address this learning objective? What kind of problem or activity do you usually assign?

- Typical end-of-chapter problem?
- A reading?
- Other?



Example from Physics: Traditional End-of-Chapter Problem

A 1500-kg car traveling east with a speed of 25 m/s collides at an intersection with a 2500-kg van traveling north at a speed of 20 m/s. Find the direction and magnitude of the velocity of the wreckage after the collision, assuming that the vehicles undergo a perfectly inelastic collision (ie, they stick together).



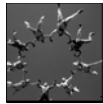
Serway and Faughn. 3rd ed. College Physics, Saunders, 1992.



Sample Learning Objectives

- **CNST 114 (10): 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).



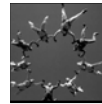


Sample Learning Objectives

BISC301 Molecular Biology of the Cell

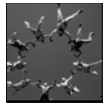
Flo Schmieg (partial list)

- Students will have learned to retrieve and share information with others
- ...be able to draw conclusions from scientific data.
- ...be able to construct a laboratory report in manuscript format.
- ...be able to evaluate scientific claims using substantiated criteria.



Step 1: Writing Learning Objectives

- Identify several learning objectives for your PBL development; consider both content and process goals.
- Traditionally, how might these learning objectives be addressed? What kind of problem or activity would you assign?



Step Two: Identify Real-World Context

Name a realistic application of the concept.

Outline a scenario.

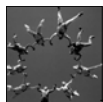
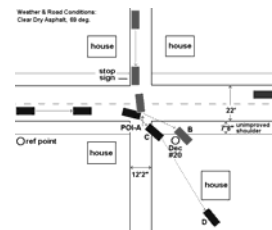
Ideas:

- Add story-telling to end-of-chapter problem.
- Add motivation, require students to go beyond rote learning, do research.
- Include decision-making, analysis, or both.
- Other?



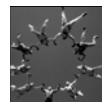
A Real Traffic Accident

- Based on police sketch
- Students need to make assumptions and approximations
- Information given gradually throughout problem



Two Schemes for Writing Problems?

- | | |
|--|---|
| 1. Think of one or more learning objectives in your course | 1. Think of a realistic scenario from the news, a videotape, or popular press article |
| 2. Name a realistic application of the concept(s). Outline a scenario. | 2. What learning objectives for your course are evident in the scenario? |



Step Three: Draft the problem

Outline the problem (create a 'story board') First consider, "What will be on the first page?"

Suggestions:

- Good PBL problem has multi-page, multi-stage construction – progressive disclosure.
- Not all information given in chapter or text - students look for resources.
- Challenge students to come to consensus, reach conclusions, and make judgments.





Consider the Following Problem Types:

Explanation or Analysis Problems

'What is going on here?'

Decision or Dilemma Problems

'What would you do?' 'What do you think?'

Task-Oriented Problems

Doing an activity or carrying out a project - for example, interviewing patients or designing a brochure.



A Day in the Life of John Henry, Traffic Cop



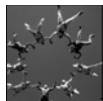
Part 1.

At 13:20 on the last Friday in September, 1989 a frantic call was received at the local police station. There had been a serious automobile accident at the intersection of Main Street and State Street, with injuries involved. Lt. John Henry arrived at the scene 10 minutes after the phone call and found that two cars had collided at the intersection. In one car, the driver was unconscious and in the other car both driver and one passenger were injured.

After the emergency vehicles transported the injured to the hospital, Lt. Henry's responsibility is to investigate the accident in order to determine whether one of the drivers (or both) are responsible. With the severity of injury in this accident, the investigation is critical because there may be a fatality involved.

Questions:

1. What questions does John Henry have to answer in this investigation? What measurements does he need to take? What data should he collect? What other information does he need to record in order to aid the investigation? What physics principles will John Henry need to use in order to help analyze the data and answer his questions?



Problem Progress Report

For presentation:

Basic features of course

Objectives for student learning

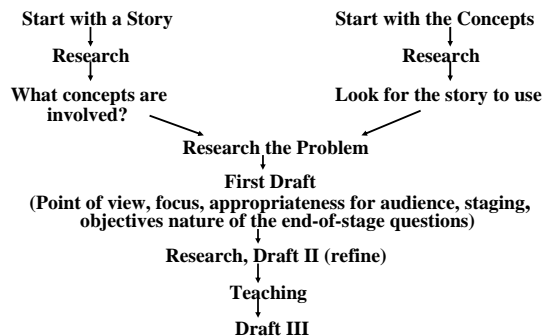
Synopsis of problem

Scenario for first page, including guiding questions

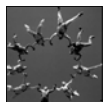
What comes next?



Writing PBL Problems



From C. F. Herreid, SUNY Buffalo & W. Welty, Pace University



Sources and Strategies for Writing Problems

Newspaper articles, news events

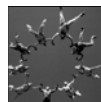
Popular press in the discipline

Make up a story – based on content objectives

Adapt a case to a problem

Research papers

Other?



Problem Writing Step 4

Continue to draft the storyline beyond a sketchy scenario – begin to write the first stage

Think about point-of-view, nature of the end-of-stage questions, suitability for 'audience,' alignment with problem and course objectives

Remember: A good PBL problem leaves just the right information out!

Challenge students to come to consensus, reach conclusions, and make judgments.

