### Rubric to Evaluate PBL Problems

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3 (ideal)</strong></td>
<td><strong>2</strong></td>
</tr>
<tr>
<td><strong>1</strong></td>
<td></td>
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<tr>
<td>Realism</td>
<td>Based on an actual or fictionalized real-world situation linking topic to learner.</td>
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<tr>
<td>Content</td>
<td>Addresses significant conceptual issues; directly related to major content goals.</td>
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<tr>
<td>Engagement</td>
<td>Stimulates discussion and inquiry through its relevance and presentation.</td>
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<tr>
<td>Complexity</td>
<td>Appropriately challenging; group effort and cooperation required; some ambiguity appropriate; integrates multiple concepts.</td>
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<td>Resolution</td>
<td>Open to multiple resolutions or multiple pathways to solution, depending on student assumptions and reasoned arguments.</td>
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<tr>
<td>Structure</td>
<td>Progressive disclosure via multiple stages, builds on existing student knowledge.</td>
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<td>Questions</td>
<td>Limited in number, short, and open-ended; stimulate probing for deeper understanding.</td>
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<tr>
<td>Research</td>
<td>Promotes substantive research using multiple resources.</td>
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**Other possible rubrics:**
- Problem Delivery and Process
- Associated Assignments
- Student Products and Presentations
Writing Effective PBL Problems

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: Solving Problems Using Conservation of Momentum

Traditional examples:
- Pool balls colliding
- Bullets hitting blocks of wood

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 (i.e., they stick together).


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

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
2. Name a realistic application of the concept(s). Outline a scenario.

1. Think of a realistic scenario from the news, a videotape, or popular press article
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.

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**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?

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**Writing PBL Problems**

Start with a Story
Research
What concepts are involved?
Research the Problem
First Draft
(Point of view, focus, appropriateness for audience, staging, objectives nature of the end-of-stage questions)
Research, Draft II (refine)
Teaching
Draft III

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

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**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?

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**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.