Writing Effective PBL Problems

Courtesy of Deborah Allen
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Effective PBL Problems...

• relate to real world, motivate students
• require decision-making or judgments
• are multi-page, multi-stage
• are designed for group-solving
• pose open-ended initial questions that encourage discussion
• incorporate course content objectives, higher order thinking

Writing Your Own Problem Starter

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 (ie, 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

Problem Writing Step One: Identify Learning Objectives

Think of a major learning objective that your problem can address.
Traditionally, how might this learning objective be addressed? What kind of problem or activity would you assign?
- Typical end-of-chapter problem?
- A reading?
- Other?

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.

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 - leave students guessing!
- 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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PBL Clearinghouse

An online database of PBL articles and problems.
All material is peer-reviewed by PBL practitioners for content and pedagogy.
All problems are supported by learning objectives and resources, teaching and assessment notes.
Holdings are searchable by author, discipline, keywords, or full text.
Fully electronic submission, review, and publication cycle.
Controlled access by free user subscription.
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

Some Additional Considerations for Step 4

A good PBL problem leaves just the right information out!
Challenge students to come to consensus, reach conclusions, and make judgments.

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