

Designing PBL Problems, Part 1: What is a Good PBL Problem?



Institute for Transforming
Undergraduate Education
University of Delaware



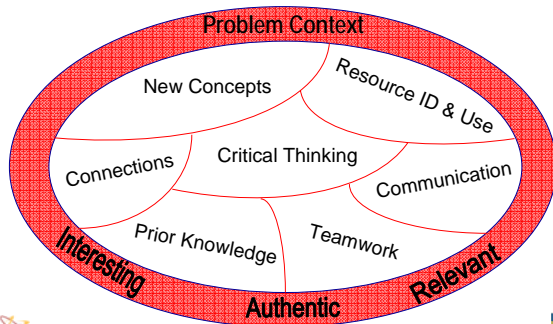
Problem-Based Learning:
From Problems to Ideas through Communication
June 2008

Central Role of the Problem in PBL

Problems provide the impetus for learning
by presenting a situation in need of resolution.

- Initial analysis of problem promotes higher order thinking, recognition of knowledge gaps : "learning to learn".
- Solution requires search for new knowledge and understanding
- Context provides framework for connecting new ideas with prior knowledge
- Problem's relevance, interest justify student efforts to learn.
- Shared quest requires communication, promotes teamwork.

A PBL Problem "Capsule"



Effective PBL Problems...

- motivate student learning through real-world relevance
- pose open-ended initial questions that encourage discussion
- lead students to identify and seek out needed information
- are complex enough to promote group effort in solving
- require decision-making or judgment (development of higher-order thinking)
- address course learning objectives

Course Learning Objectives

PBL problems should address the course learning objectives,
ideally including both content and process issues.

Content Objectives

Basic knowledge and understanding of specific concepts, techniques, ways of knowing, etc. in a specific discipline

Process Objectives

Global skills, including:

- Effective communication (written and oral)
- Finding, evaluating information
- Effective teamwork
- Higher order thinking

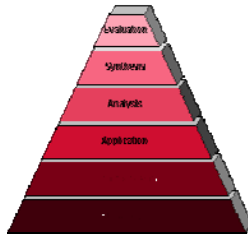
Learning Objectives for "Sustainability"

Process Objectives

- Allow participants to experience PBL from student perspective
- Demonstrate fundamental PBL methodology, including
 - Use of staged problem
 - method for forming heterogeneous groups in large class
 - use of jigsaw technique
- Demonstrate use of wiki technology in group work
- Demonstrate ways to incorporate group-based writing

Bloom's Cognitive Levels

A classification of intellectual behaviors important for learning



<http://www.learningandteaching.info/learning/bloomtax.htm>

- Evaluation** - make a judgment based on criteria
- Synthesis** - produce something *new* from component parts
- Analysis** - break material into parts to see interrelationships
- Application** - apply concept to a *new* situation
- Comprehension** - explain, interpret
- Knowledge** - remember facts, concepts, definitions

Bloom, B.S., ed. (1956) *Taxonomy of Educational Objectives*

Bloom's Taxonomy Revised

Cognitive Levels	Knowledge Levels			
	Factual	Conceptual	Procedural	Met a-cognitive
Create				
Evaluate				
Analyze				
Apply				
Understand				
Remember				

- Knowledge and cognitive domains combined
- Behaviors transformed from nouns to verbs
- Synthesis elevated above evaluation



<http://www.learningandteaching.info/learning/bloomtax.htm>

Anderson and Krathwohl, eds. (2001) *Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*

Other Dimensions of Learning

"Taxonomy of Significant Learning", L. Dee Fink



L. Dee Fink (2003) *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*

"Significant Learning" defined as lasting, important change in learner - not just cognitive

Interactive, rather than hierarchical, levels

Other Dimensions of Learning

"Six Facets of Understanding", Wiggins and Tighe

Explanation	Sophisticated, knowledge-based justification of observations and ideas
Interpretation	Subtle, thorough grasp of meaning of texts, data, events
Application	Authentic use of ideas, processes in new/diverse contexts
Perspective	Critical analysis from different viewpoints
Empathy	Sensitivity to others
Self-knowledge	Awareness of limitations of one's knowledge, biases and habits

Wiggins and Tighe (1998), *Understanding by Design*

Rubric to Evaluate PBL Problems

Criteria	Descriptors		
	3	2	1
	Based on ideal for student-centered class of mature learners	May be fine for more directed class of novice learners	Generally undesirable in any setting

Criteria include a problem's: realism, content, ability to engage students, complexity, structure/staging, resolution, questions posed, requirements for research and resources.

Preparing for Problem Writing

In this afternoon's session, you will begin to write a problem for your course.

Over lunch, please think about possible topics or concepts that you might introduce through a problem.