

# Designing PBL Problems: Part 1



*Institute for Transforming  
Undergraduate Education*

*University of Delaware*



Problem-Based Learning:  
From Ideas to Solutions through Communication  
January 2007

# Central Role of the Problem in PBL

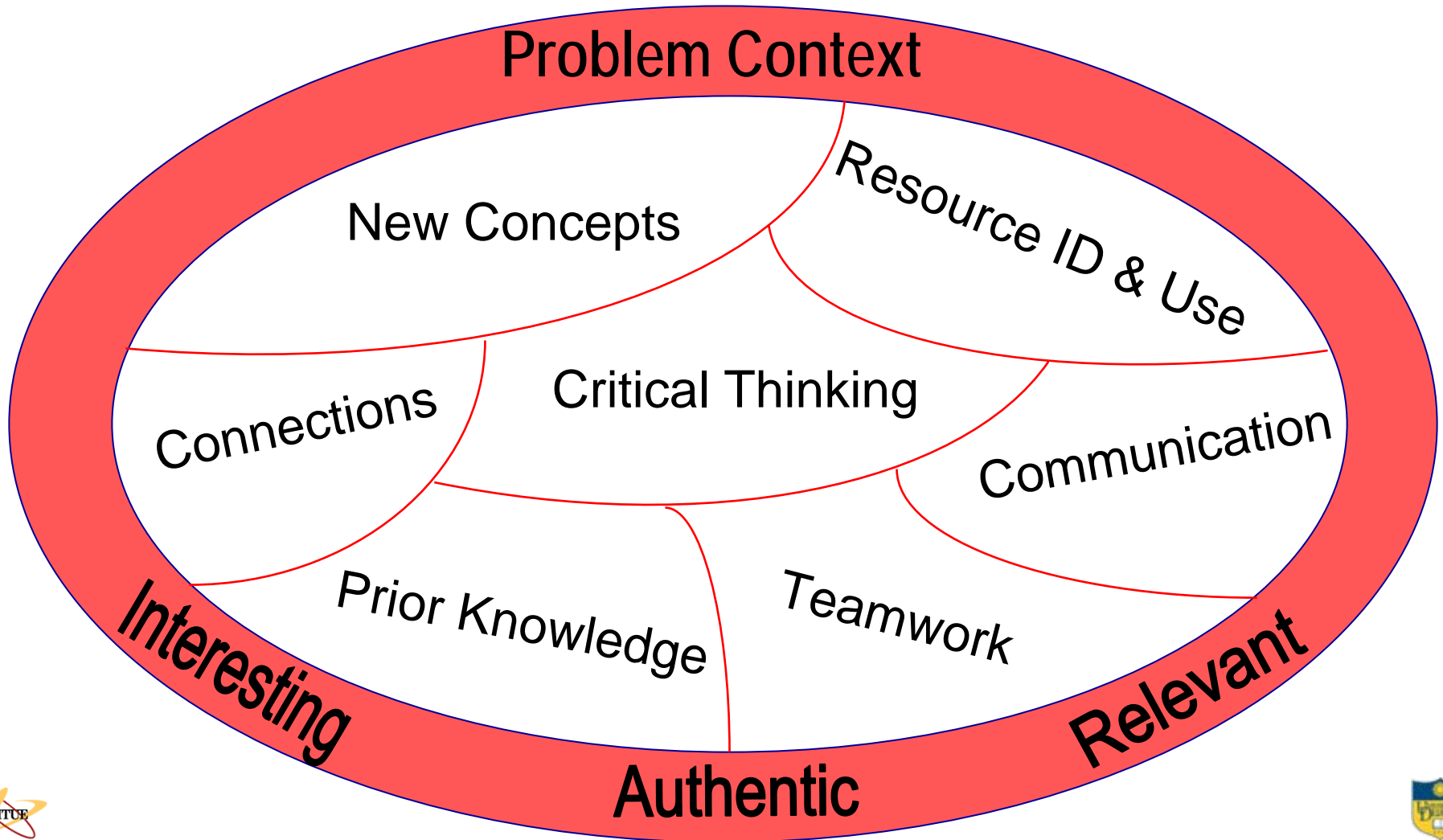
---

---

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

# “Preparing Citizens of the Future”

---

---

*Was this an effective PBL problem?*

*Why or why not?*

# More on Learning Objectives

---

---

## 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

# Bloom's Cognitive Levels

---

---



**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's Taxonomy Revised

<i>Knowledge Levels</i>	<i>Cognitive levels</i>					
	Re member	Un ders tand	App ly	Ana lyze	Eva lua te	Cre ate
Factual						
Conceptual						
Procedural						
Meta - cognitive						



Knowledge and cognitive domains combined; synthesis elevated above evaluation *Anderson and Krathwohl, eds. (2001) Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives.*

# Other Dimensions of Learning

---

---

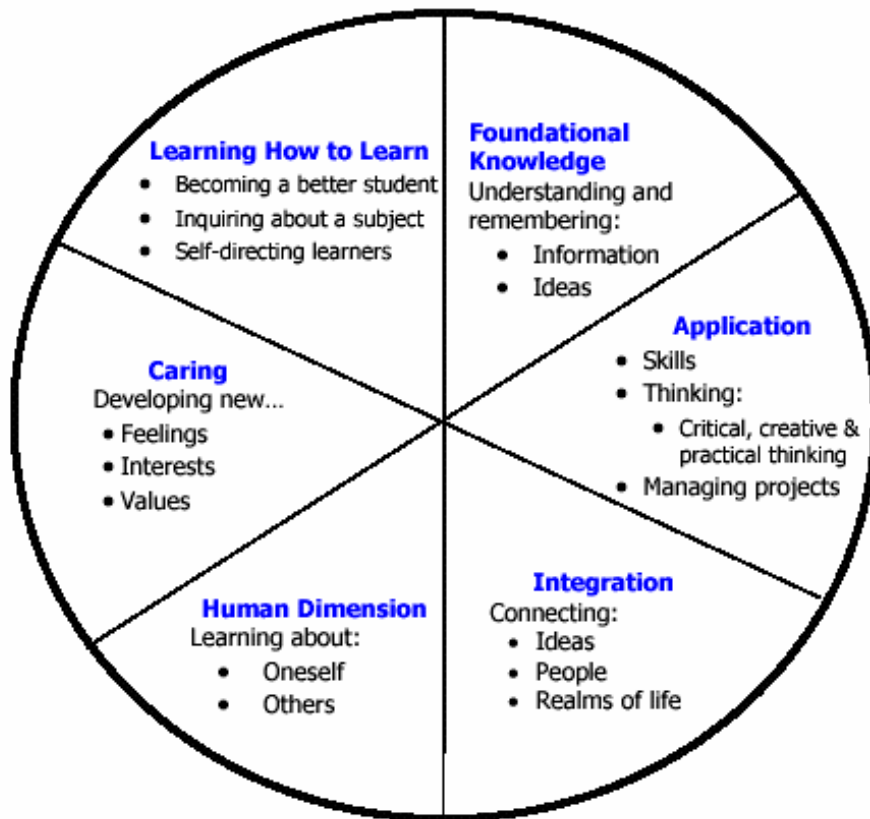
Two prominent course design models suggest other elements of learning that problems may address.

*Fink's "Taxonomy of Significant Learning":*  
foundational knowledge, application, integration, human dimension, caring, and learning how to learn.

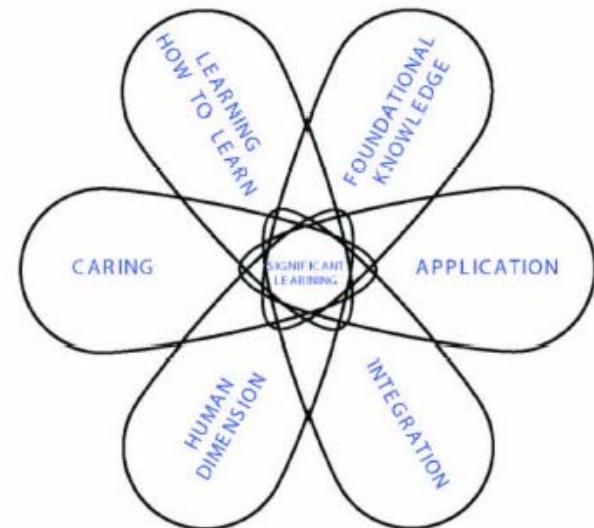
*Wiggins and McTighe's "Six Facets of Understanding":*  
explanation, empathy, interpretation, application, self-knowledge, perspective

# Taxonomy of Significant Learning

## THE TAXONOMY OF SIGNIFICANT LEARNING



- “Significant Learning” defined as lasting, important change in learner - not just cognitive
- Interactive rather than hierarchical levels



# Six Facets of Understanding

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

# Rubric to Evaluate PBL Problems

	Descriptors		
Criteria	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. (*Could also evaluate associated student products, assignments, assessments.*)

# Preparing for Part 2

---

---

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.*