Introduction to
Problem-Based Learning

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Handouts for Day 3
Wrapping Up PBL Problems

What does it mean when a student says, *I understand*?....

Does *understanding* mean the same thing to that student that it does to another student or to you, the professor?.....

How can students demonstrate their *understanding* to others?

Good Assignments Provide Accountability

Students can demonstrate what they understand.

Instructors can assess how well students understand.

Good Assignments Provide Closure to PBL Problems

- PBL problems are typically open-ended.
- Student within a single group often pursue different learning issues.
- Students frequently have difficulty knowing what the instructor thinks is important.
- Assignments focus on central issues and bring closure to PBL problems

There are different ways to Wrap-up PBL Problems

Considerations for PBL Assignments

- Individual or group response?
- Course/problem content objectives?
- General education and PBL goals?
- Graded or not?
- Difficulty? (Bloom’s Taxonomy)
- Interest level for students?
- Form of the response?
**PBL Problem Assignments**

**Written assignments**
- Write a 2-3 page paper on a learning issue you researched.
- Critique this recent magazine article in terms of the problem you have just finished.
- Transform an experiment described in this article into a laboratory exercise appropriate for undergraduates.

Who is the audience in each case?

**PBL Problem Assignments**

**Written assignments**
- Write a letter to the editor of your local newspaper on this issue.
- Compose a 200 word abstract for the article you have just read based on the Instructions to Authors in a disciplinary journal.
- Research a topic related to the course and write a PBL problem for this course based on that topic.

Who is the audience in each case?

**PBL Problem Assignments**

**Written and visual assignment**
Create a website appropriate for high school students on this topic.

**PBL Problem Assignments**

**Written, oral, and visual assignments**
- Prepare a case for your position and present it to the class as a debate.
- Prepare a 15-minute persuasive talk and handouts on this topic for the Board of Trustees. Use PowerPoint slides.

**PBL Problem Assignments**

**Visual Assignment**
Prepare a concept map incorporating the major issues related to this problem.

**What is a Concept Map**

"a general method with which one can clarify and describe people's ideas about some topic in a graphical form"

Katsumoto 1997

A pictorial representation that shows the relationships between and among a connected set of concepts and ideas
Purposes for Concept Mapping

- Generate ideas (brainstorming)
- Design complex structures (long texts, web-sites)
- Communicate complex ideas
- Aid learning by explicitly integrating new and old knowledge
- Assess understanding or diagnose misunderstanding

A Concept Map Based on the Proposition: Without the industrial chemical reduction of atmospheric nitrogen, starvation would be rampant in third world countries.

Stages in the Construction of a Concept Map

- Brainstorming Stage
- Organizing Stage
- Layout Stage
- Linking Stage
- Revising Stage
- Finalizing Stage

Brainstorming Stage

- List any and all terms and concepts associated with the topic of interest.
- Write them on Post It® Notes, one word or phrase per note.
- Don't worry about redundancy, relative importance, or relationships at this point.
- The objective is to generate the largest possible list.
Organizing Stage

• Spread concepts on a table or blackboard so that all can be read easily.
• Create groups and sub-groups of related items. Try to group items to emphasize hierarchies.
• Identify terms that represent higher categories and add them.
• Feel free to rearrange items and introduce new items omitted initially.
• Some concepts will fall into multiple groupings. This will become important in the linking stage.

Layout Stage

• Arrange terms so that they represent your collective understanding of the interrelationships and connections among groupings.
• Use a consistent hierarchy in which the most important concepts are in the center or at the top.
• Within sub-grouping, place closely related items near to each other.
• Think in terms of connecting the items in a simple sentence that shows the relationship between them.
• Feel free to rearrange things at any time during this phase.
• Do not expect your layout to be like that of other groups.

Linking Stage

• Use arrows to connect and show the relationship between connected items.
• Write a word or short phrase by each arrow to specify the relationship.
• Many arrows can originate or terminate on particularly important concepts.

Revising Stage

• Carefully examine the draft concept map.
• Rearrange sections to emphasize organization and appearance.
• Remove or combine items to simplify.
• Consider adding color or different fonts.
• Discuss any aspects where opinions differ

Finalizing the Concept Map

• After your group has agreed on an arrangement of items that conveys your understanding, convert the concept map into a permanent form that others can view and discuss.
• Be creative in a constructive way through the use of colors, fonts, shapes.

Peer Evaluation of Concept Maps

Compare the concept maps and rank order them with respect to the following criteria:
• **Accuracy and Thoroughness.** Are the concepts and relationships correct? Are important concepts missing? Are misconceptions apparent?
• **Organization.** Is the concept map laid out in a way that higher order relationships are apparent and easy to follow? Does it have a title?
• **Appearance.** Is the assignment done with care showing attention to details such as spelling and penmanship? Is it neat and orderly or is it chaotic and messy?
• **Creativity.** Are there unusual elements that aid communication or stimulate interest without being distracting?
STAGE 3

In your new role as an advocate for a stakeholder group, create a concept map that describes Portal's problem and how the problem affects your stakeholder group. Be sure to consider the following focus questions:

1. Is Portal's decision to offshore its call centers important to your stakeholder group? How?

2. How does Portal's customer service performance directly or indirectly affect your stakeholder group?

3. What information do you need to find in order to be an effective advocate for your stakeholder group? Where do you think you can find the information?

Use PowerPoint or any other drawing tool to create your concept map. When your team is finished, post your model to the SharePoint Shared Documents area. Name the file with the stakeholder function to which you were assigned (e.g., Extend Concept Map.ppt).
Orientation to the PBL Clearinghouse:
An Electronic Peer-Reviewed Publication

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Characteristics of Good PBL Problems

- Relate to real-world, motivate students
- Require decision-making or judgements
- Multi-page, multi-stage
- Designed for group-solving
- Initial questions open-ended, encourages discussion
- Incorporates course content objectives
- Challenges to higher-order thinking

But...where are the problems?

Typical end-of-chapter problems can be solved by rote memorization, pattern-match, and plug-and-chug techniques

Good problems should require students to make assumptions and estimates, develop models, and work through the model.

A source of problems outside the commercial texts needs to be developed.

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, students excluded.

A Brief Tour of the Clearinghouse

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