



PBL approach in EDUCATION

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What is a... problem?

- A **problem** is a situation in which one has a goal but must find a means for reaching it (Chi & Glaser, 1985).
- **Problem-solving** refers to the effort to achieve a goal for which there is no automatic solution.

What is a... problem?

- In the language of information–processing, a problem has three components:
 - an initial state,
 - a set of permissible operations,
 - a goal state.

What is a... problem?

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- There are two classes of problems:
 - **well defined** and
 - **ill defined.**

What is a... problem?

- With **well defined** problems
 - each component is clear,
 - you can readily recognize when the problem is solved.

What is a... problem?

- A problem is **ill-defined** if any one, or all, of the three components is not well specified:
 - ~~The initial state is vague. The problem situation is so complex that we really do not understand it very well.~~
 - The operators are not well specified. The various actions that might be taken to modify the initial state are not clear, and many possible actions have not yet been formulated.
 - The goal state is not clear. Often there is a lack of consensus even among experts about what the appropriate solution is.
- Problem-based learning (PBL) deals with the latter type, the ill-structured, real-world problems. The process of solving such problems is difficult and complex.

What is Problem-Based Learning?

- *a pedagogical methodology by which learning is initiated with a posed problem*

Students assume a role in the problem scenario and are led through a process in which they:

- a) pose questions, “learning issues,” identifying what they need to know in order to address the problem
- b) rank the learning issues in terms of importance and decide who will investigate which issue
- c) identify needed resources and where they might be found
- d) collect needed information through individual and group investigation

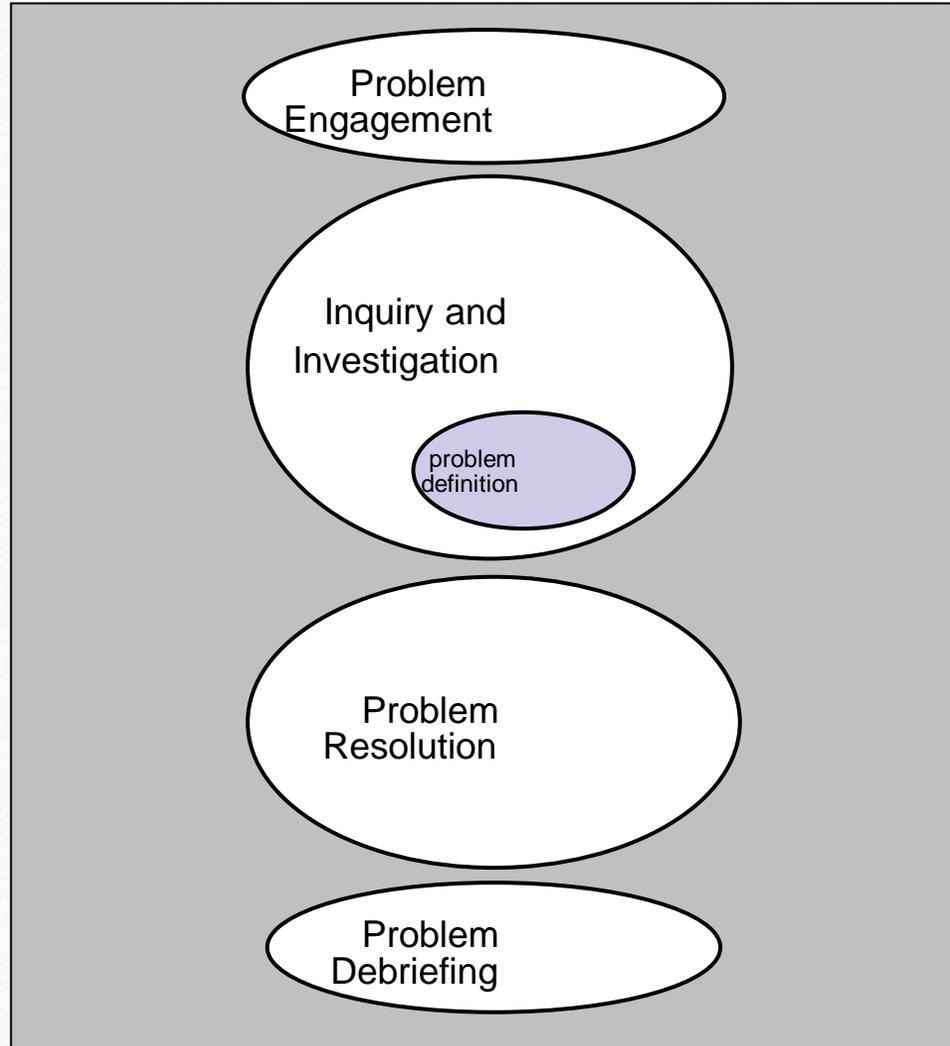
What is Problem-Based Learning?

- a pedagogical methodology by which learning is initiated with a posed problem

Students assume a role in the problem scenario and are led through a process in which they:

- e) reconvene to integrate information
- f) generate and evaluate possible solutions
- g) make needed decisions or take agreed upon actions
- h) communicate results as appropriate for problem resolution
- i) step out of role to debrief on problem solving experience

What is Problem-Based Learning?



The "flow" of problem-based learning:
Stepien, W.J., & Pyke, S.L. (1997). Designing problem-based learning units. *Journal for the Education of the Gifted*, 20(4), 380-400; The four phases include

Stepien & Gallagher

	PROBLEM SOLVING	PROBLEM-BASED LEARNING
Educational strategy	Traditional discipline-based	Integrated systems-based
Main characteristics	<ul style="list-style-type: none"> - The focus is on preparatory learning prior to exposure to the problem. - The staff set the problems (case history problems in a primarily lecture-based format), and students attempt to resolve them using previously taught curricular content. 	<ul style="list-style-type: none"> - The problem comes first without advance readings, lectures, or preparation. - The problem serves as a stimulus for the need to know. - Based on their own prior knowledge and the identified gaps in that knowledge, students determine the learning issues within their own group. They then identify and use a variety of learning resources to study these issues and return to the group to discuss and share what they have learned.

	PROBLEM SOLVING	PROBLEM-BASED LEARNING
Role of the teacher	Content expert	Tutor/Facilitator
Learning environment	Passive, teacher-centered	Learning becomes dependent upon the self-directed efforts of the small group. This method creates a <u>more active, student-centered</u> learning environment
Who is responsible for directing the learning activities	Teacher	The student decides what he/she needs to learn

What is Problem-Based Learning?

Problem-Based Learning (PBL) is characterized by:

meaningful activity – PBL engages students in problems that are designed to be realistic, intriguing, and relevant to the field of study. Meaningful problems thus serve as the context and the stimulus for knowledge-building and critical thinking.

situated learning – PBL creates an environment that permits students to work on the kinds of problems that professionals encounter and to use the perspectives, the knowledge, and the skills that professionals use in attempting to solve them.

What is Problem-Based Learning?

Problem-Based Learning (PBL) is characterized by:

open-ended generative tasks – PBL engages students in an ill-structured, open-ended problem for which there is no prescribed approach or solution. Students become intentional learners as they generate their own questions, plans, and goals.

collaborative decision-making and problem-solving – PBL encourages students to work together in their problem solving and product development. Students collaborate with each other and with more knowledgeable individuals who model expert behaviors and lend assistance as students try out skills on their own.

What is Problem-Based Learning?

Problem-Based Learning (PBL) is characterized by:

changed role of the instructor -- Instructors act as metacognitive coaches throughout the PBL process. They model and coach, giving students guidance as needed, but encouraging student independence in goal setting and decision-making.

Why Use Problem-Based Learning?

It increases the likelihood of transfer, a primary consideration in teacher education.

The literature on transfer suggests that transferable learning experiences occur in an environment characterized by:

- Meaningful activity
- Expert guidance
- Knowledge-building collaboration

Why Use Problem-Based Learning?

It promotes desirable student outcomes:

- Intentional learning
- Relational understanding
- Critical thinking
- Creative thinking
- Effective collaboration
- Versatile communication

How Do We Feel About Using PBL in Teacher Education?

It's different!

- Student driven
- Problems prompt, rather than follow, skill development

It's hard!

- Developing a “good” problem*
- Consistent use of guided inquiry
- Giving up control

It's time-consuming!

- Planning
- Implementing

It's wonderful!

- High engagement
- Self-directed learning

How do I get started with PBL?

Develop problems that:

- Capture students' interest by relating to real-world issues.
 - Draw on students' previous learning and experience.
 - Integrate content objectives with problem-solving skills.
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- Require a cooperative, multi-staged method to solve.
 - Necessitate that students do some independent research to gather all information relevant to the problem.

Design assessment tools that:

- Account for *process* (e.g. research, collaboration) as well as content skills.
- Are closely tied to course learning objectives.
- Balance individual and group performance.

How to create effective PBL scenarios

- Learning objectives likely to be defined by the students after studying the scenario should be consistent with the faculty learning objectives
 - Problems should be appropriate to the stage of the curriculum and the level of the students' understanding
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- Scenarios should have sufficient intrinsic interest for the students or relevance to future practice
 - Basic science should be presented in the context of a clinical scenario to encourage integration of knowledge
 - Scenarios should contain cues to stimulate discussion and encourage students to seek explanations for the issues presented
 - The problem should be sufficiently open, so that discussion is not curtailed too early in the process
 - Scenarios should promote participation by the students in seeking information from various learning resources

CHECKLIST FOR PROBLEM CONSTRUCTION

- **Is the content of the problem geared to students' prior knowledge?**
- **Is there a clear connection with one or more of the objectives of the block?**
- **Is the problem sufficiently complex to offer cues for initial discussion and for generating learning issues?**
- **Is the problem structured in such a way that it offers cues for discussion in the group?**
- **Has the problem been formulated clearly and, if possible, does it offer links with professional practice?**

CHECKLIST FOR PROBLEM CONSTRUCTION

- Is the problem multidisciplinary and is clear to students?
- Is the available time sufficient for studying the learning issues?
- Does the length of the problem enable inclusion of all the relevant information that is needed for identifying learning issues and does the problem not contain superfluous irrelevant information?
- Is there sufficient time available for reporting on all the learning issues?
- Does the block offer sufficient variety in learning activities, i.e. does it include different types and formats of problems?
- Is the number of problems geared to the number of group meetings in the block?
- Has a schedule been drawn up that specifies which problems are to be discussed when?
- Which problems should be tackled in a specific sequence?

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Related Reading

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