

Resource Guide

A Brief Introduction to Problem-Based Learning (PBL)

Problem-based Learning (PBL) originated in medical studies where simple knowledge is expected to evolve rapidly, but problem-solving processes (e.g., diagnosis) remain similar over time. By focusing on solving problems that could be encountered in future employment, PBL situates teaching around skills and knowledge that support real-world problem solving (Savery, 2006).

- **Problems must reflect reality.** PBL varies from case-studies in that PBL is most effective when the problems driving learning are not well structured and do not have obvious, immediately recognizable solutions. This motivates the development of critical thinking skills related to identifying solutions to problems. The solutions that students find may vary, but will all apply the traditional skills and knowledge you would expect in a content-focused college course. The abstraction in learning how to approach the problem provides greater opportunities for course-specific skills to be applied in conjunction with skills from other courses or disciplines.
- **Begin with minimal information.** This may seem counter-intuitive, but by introducing the broadest details about a complex problem, students are invited to seek gaps in their knowledge and begin asking questions about the problem (Hmelo-Silver, 2004). Additionally, encouraging students to identify solutions with less guidance (but equal or more scaffolded support) can lead to them identifying relevant learning themes that you may not have originally identified. For instance, Dolmans et al. (1994) found a 64% overlap between faculty and students' identification of primary learning topics, but the degree of overlap had little effect on student mastery. The authors suggested that faculty often propose complex problems with a solution in mind but their solution, based on their expert knowledge, often differs from students' solutions.
- **Support student motivation with scaffolds and prepared resources.** Students taking problem-motivated action will quickly be demotivated if they don't have easy access to the resources necessary to see their idea to fruition. If moving from purely content-based instruction to PBL, your existing lessons may be repurposed as on-demand resources for students to learn about content within the context of their planned implementation. As the instructor, helping guide students to organize their tasks and being prepared with resources will help students feel more capable of solving the challenging, abstract problem driving PBL in your course. Technology can help instructors and students with PBL, as course Canvas pages or other technological resources may be prepared ahead of time, empowering students to seek course content as they need it. This can also increase the variety of ways in which course content is provided, offering greater choice to your

students while reflecting the variety of resources they are likely to have at their disposal in future employment contexts (Blumenfeld et al., 1991).

- **Plan for error diagnosis and correction.** Providing ambiguous, challenging problems for learners with little to no experience handling problems of this sort will inevitably lead to mistakes and the pursuit of ineffective solutions. In fact, mistakes are part of the problem-solving process and understanding how to identify and correct them is an essential part of PBL. Thus, part of your student support and scaffolding should be planned reflections with opportunities for instructor interaction to identify and correct errors. Focusing on the meta-cognitive processes (thinking about thinking) associated with solving complex problems has been shown to improve student awareness of their learning when compared with traditional courses. In one example, 68% of graduate students reported higher awareness of what they have learned and how to apply it (Sart, 2014).

PBL, while more intensive to set up due to the need for on-demand resources, can be deeply rewarding for students who learn to recognize the interaction between problem-solving skills and the course content.

Resources

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Dolmans, D. H., Schmidt, H. G., & Gijssels, W. H. (1994). The relationship between student-generated learning issues and self-study in problem-based learning. *Instructional science*, 22(4), 251-267.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235-266.

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Savery, J. R. (2016). Overview of problem-based learning: Definitions and distinctions. *Essential readings in problem-based learning: Exploring and extending the legacy of Howard S. Barrows*, 9(2), 5-15.

For more information or to discuss how you might incorporate these ideas into your courses, contact the Reinert Center by [email](#).