Teaching Strategies Showcase

Indiana University’s Teaching for Student Success

Module 6: Active Learning

Title: Problem-Based Learning

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# Context for this strategy

Problem-based learning (PBL) is an instructional method where small groups of students learn collaboratively through facilitated problem solving. PBL helps develop content knowledge, critical thinking strategies, and self-directed learning skills while solving authentic problems in collaboration with other students. This strategy can be implemented either on a smaller scale, over one class period, or on a larger scale, depending on the nature of the content.

# Materials needed to implement this strategy

* At least one laptop with an internet connection per student group
* Interactive whiteboard (e.g., whiteboard (<https://webwhiteboard.com/>)
  + If students do not have access to an interactive whiteboard, they can use a traditional dry-erase board or a blackboard.

# Step-by-step implementation

1. Introduce the PBL process to the students. You can describe the process as follows:
   1. Learning with PBL involves using an authentic real-life problem, which is presented to students as the first step in the process.
   2. The students then identify learning gaps by comparing what they know to what they want to know.
   3. This is followed by defining the task and identifying things that need to be accomplished to complete the problem, which involves generating a hypothesis about the problem and setting learning objectives.
   4. This will lead to researching and gathering necessary information.
   5. Once information is gathered, students revise their initial hypothesis and formulate a solution to the problem.
   6. The solution is then presented to the whole class, to a panel, or to the facilitator.
   7. The process should end with a student reflection.
2. Present a real-life problem for students to solve. It is best to introduce the problem in a format that helps get student buy-in and initiates student inquiry (e.g., scripted video that your colleagues can act in).
3. Elevate the purpose of the problem by discussing it with the students and using real-life examples as a hook designed to increase engagement and motivation.
4. Divide students into small groups and have them assign roles, including:
   1. Timekeeper- makes sure that the group stays on track
   2. Summarizer- provides a summary of the discussion for other students to approve or amend
   3. Recorder- takes notes on the whiteboard
   4. Team member- participates in discussion and reviews resource materials
5. Facilitate the process and provide scaffolding as needed. Some facilitation techniques that may be used include:

* Jump starting- asking students about how they plan to approach the problem
* Check-ups- asking students to think about how what they are discussing relates to their goal of solving the problem at hand
* Stepping back- asking students to step back and talk about their learning goals; this assures that they remain focused on the problem
* Dropping hints- helping students move forward when they are stuck in the problem-solving process

1. Students present their solutions to the problem. You may consider providing a rubric or a list of expectations to help students stay on task. This step of the process allows groups to learn from each other’s solutions.
2. Students reflect on their learning. The reflection can be structured, depending on what best fits the learning situation.

# Student response to this strategy

# When asked about what they like the most about PBL, students mention the knowledge gained, both general and topic-specific, working in a group environment, and sharing ideas and opinions. Some students dislike working in a group, which has to do with group dynamics and can be mitigated by having students self-select their groups.

# Additional resources

Derry, S. J., Hmelo-Silver, C. E., Nagarajan, A., Chernobilsky, E., & Beitzel, B. (2006). Cognitive transfer revisited: Can we exploit new media to solve old problems on a large scale? *Journal of Educational Computing Research, 35*, 145-162. doi:10.2190%2F0576-R724-T149-5432

Ertmer, P. A., & Glazewski, K. D. (2015). Essentials for PBL implementation: Fostering collaboration, transforming roles, and scaffolding learning. In P. A. Ertmer (Ed.), *Essential readings in problem-based learning*: Purdue University Press.

Ertmer, P. A., & Glazewski, K. D. (2019). Scaffolding in PBL environments: Structuring and problematizing relevant task features. In M. Moallem, W. Hung, & N. Dabbagh (Eds.), *The Wiley handbook of problem-based learning*. NJ: John Wiley & Sons, Inc.

Hmelo-Silver, C. E., & Ferrari, M. (1997). The problem-based learning tutorial: Cultivating higher order thinking skills. *Journal for the Education of the Gifted, 20*(4), 401-422. doi:10.1177%2F016235329702000405