

Problem-Based Learning

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Problem-Based Learning

Many educators today contend that problem solving is one of the most important skills students can develop. When students learn to solve problems, they're doing more than just collecting information—they're also honing their critical thinking and decision-making skills. When curriculums are designed around problems, students have opportunities to direct their own investigations while at the same time working collaboratively with others (Barrows and Myers 1997, O'Neil 1992). Through problem-based learning (PBL), which requires students to grapple with real-world issues, students become better prepared to work in a rapidly changing global marketplace (Jones, Rasmussen, and Moffitt 1997).

What Is PBL?

Problem-based learning has its roots in medical education, where for two decades it has helped medical students sharpen their diagnostic skills. PBL features carefully designed, open-ended problems—called ill-structured problems—that give students just enough information to guide an investigation. Such problems cannot be solved using algorithms or formulas, they may change as more information is gathered, and they have more than one solution (Barrows and Myers 1997).

In a PBL course, students usually work on one problem for weeks or months, becoming deeply familiar with the learning issues each problem presents. Teachers use the ill-structured problems as a way for students to learn the content: problems are designed so students will meet expectations for learning and will cover required academic material (O'Neil 1992).

Teachers in the PBL Classroom

Most PBL approaches are based on constructivist philosophy, which emphasizes student-directed learning (Jones et al. 1997). Teachers, therefore, must become “coaches” who guide students through the inquiry process. This is a demanding role for teachers because they must continually probe students' thinking, challenge students' assumptions and conclusions, and help students find the resources they need to continue searching for information. The teacher's role throughout the inquiry process is to model the self-questioning skills that students must develop if they are to become self-reflective (Barrows and Myers 1997).

Students in the PBL Classroom

Students take the lead in a PBL course. Because their investigations focus on the issues and questions they identify, students engaged in the

PBL process make their own choices and take ownership of their learning. And because students work with experts, policymakers, and community members to find solutions, they discover that their work is valued by others and that what they study has real-world purposes (Jones et al. 1997). What's more, because well-designed problems have multiple solutions, students learn to view issues from multiple perspectives (O'Neil 1992).

Challenges

Despite the benefits of PBL, there are concerns. Will students cover as much academic content in a PBL unit as they would in a more traditional class? What happens when teachers lack the skills they need to be facilitators? What if students resist the approach?

Students in a PBL class will indeed cover as much content as students in more traditional settings, but they learn the required information when it is germane to the problem they are trying to solve. So *when* they cover a particular fact or topic varies, depending on when it is most relevant. Another consideration—and an even more compelling argument for the PBL approach—is not how much academic content students cover but how deeply they learn it. PBL students seem to have a greater understanding of the material they are required to learn. Comparing test scores over the long term bears this out: at the end of their second year, PBL and traditionally trained students at Southern Illinois University School of Medicine do equally well on the national board exam, but by the end of the fourth year, PBL-trained students perform better (Barrows 1997).

Boosting student achievement convinces many teachers to try a PBL approach, but for problem-based learning to succeed, professional development for these teachers is a must. Teachers need time to work with other teachers in planning PBL units, which, by their nature, are interdisciplinary and require coordination of lesson plans (Jones et al. 1997). Teachers also benefit from talking with colleagues who have successfully implemented PBL, to learn of their challenges and achievements. Teachers who aren't inclined to be coaches need encouragement to tell students, "I don't know the answer to that question, let's find out"; they will discover that students admire them more for being their guide than for having all the answers. And to sustain them in this difficult change process, teachers must know there is a clear commitment to PBL from their administrators (Gallagher 1997).

Students, too, need extra support when they are first introduced to PBL. Students who perform well in traditional settings are sometimes anxious when PBL is introduced into the classroom. These students may be used to getting the right answers and having both teachers and other students look to them for leadership. In PBL activities there is no single “right” answer, and these students may feel they no longer have the edge. Such students may also find it difficult at first to accept multiple perspectives, and they may need to learn how to work collaboratively with their peers (Jones et al. 1997). Usually these problems diminish as all students become empowered and learn to work together to find solutions rather than compete for grades (Barrows 1997).

Summary

Problem-based learning is an instructional method that helps ensure that students can apply what they learn to real-life tasks. With its emphasis on ill-structured problems, PBL requires that students become active learners, engaged in the reiterative process of problem identification, hypothesis building, research, and synthesis that leads, finally, to a proposed solution (O’Neil 1992). Teachers must design problems that foster inquiry while ensuring that students cover academic content objectives. Teachers must also let students direct their own investigations, helping them think through their approaches and guiding them in their search for information (Barrows and Myers 1997). Through PBL, students become better problem solvers because they are actively solving problems, thereby honing their reasoning skills and learning the value of collaboration and persistence. Through PBL, students are better prepared to cope in a complex and ever-changing workplace.

This video-based program is for everyone interested in discovering how problem-based learning can help develop the subject matter backgrounds of students while enhancing their problem-solving ability through direct experience with real-world problems. The videotapes and *Facilitator’s Guide* can be used to educate school staff and community members about problem-based learning and to provide sufficient understanding of its elements to encourage and enable you to begin experimenting with and integrating PBL into your program.

Intended Audience

Components of the Program

This video-based staff development program consists of two comprehensive videotapes and the *Facilitator's Guide*. The videotapes show how educators and schools approach and implement problem-based learning. Interviews and on-site observations in four schools portray an accurate picture of the many variables involved in creating and using PBL units. The videotapes also present examples of the essential ingredients for developing PBL units that can help students reach the desired curriculum outcomes in discipline-specific or interdisciplinary courses. Opportunities exist to stop both videotapes and engage in group discussion.

Program 1, *Problem-Based Learning: Using Problems to Learn*, gives an overview of the subject. It explores the characteristics of problem-based learning, the stages of a PBL unit, the reasoning skills needed to resolve problems, the roles of the teacher and students, and the requirements to successfully bring problem-based learning into a school. Program 2, *Problem-Based Learning: Designing Problems for Learning*, focuses on how to implement the PBL approach. It examines the process for finding the right problem situation and role for students, for planning how to coach students, and for assessing a problem-based learning unit.

The *Facilitator's Guide* provides materials that clarify and expand on the ideas presented in the videotapes. The “Workshops” section of the guide features four workshops of different lengths to help viewers explore problem-based learning in increasing depth. The section provides agendas, step-by-step guidelines for the workshop facilitator, and activities that can be used to promote group discussion and discovery. The “Handouts and Overheads” section contains the materials to be duplicated and distributed to participants in each workshop, along with camera-ready masters for overhead transparencies. In the final section of the guide, “Resources and Readings,” you will find information about the schools featured in the videotapes and materials from their PBL units. In addition, this section provides reference articles pertinent to problem-based learning. The articles may be duplicated and distributed to participants.

The *Facilitator's Guide* is designed to help the facilitator and the workshop participants get the most out of this video series on problem-based learning—to help participants and their schools begin planning for the effective use of PBL. The workshop activities and discussion questions can serve as a starting point. However, the facilitator's choice of activities and questions should not be limited to those contained in these pages. Indeed, facilitators should encourage participants to raise their own questions based on the particular needs or concerns of their students, schools, and community.

Role of the Facilitator

As the facilitator of these workshops, keep in mind that when different people view a videotape, each person may see, hear, and learn something different. Consequently, if participants discuss their different insights, they will often learn more than if they viewed the videotapes without any follow-up. Moreover, viewing videotapes can be a passive activity, much like watching television, unless careful preparation makes it an intellectually active experience by providing appropriate discussion topics and exercises before and after the viewing. The follow-up activities can promote further reflection and support participants' efforts to apply the ideas presented in the program.

Your preparation and openness to discussion will help your group benefit from this program. You may be showing these videotapes to a diverse audience, and your background knowledge and outside reading will be beneficial. As a facilitator, you have several major responsibilities.

Read and View the Materials

Your initial preparation should include viewing the videotape(s) you are going to show, reading this guide, and studying the workshop format you plan to use.

Prepare the Program Activities

Select the workshop activities you will use and modify them, if necessary, to meet the needs of your audience. Prepare an agenda, allowing time for breaks, and arrange for refreshments if desired.

Know Your Subject

To prepare to guide a group through the workshop discussions, consider your own knowledge about problem-based learning. Review the information and articles contained in the "Resources and Readings" section of this guide and consult other sources as necessary.

Check the Room and the Seating Arrangements

Reserve a room that is large enough and has ample seating for the number of participants you expect. Ensure that the physical arrangement is conducive to small-group discussions.