What is PBL?

Problem-based Learning: PBL is any learning environment in which the problem drives the learning. That is, before students **learn** some knowledge they are given a problem. The problem is posed so that the students discover that they need to learn some new knowledge before they can solve the problem. Some example problem-based learning environments include:

•research projects

•engineering design projects that are more than a synthesis of previously learned knowledge

The traditional and well-known "Case approach", popular with business schools, may or may not be problem-based learning. Often the case is used to integrate previously-learned knowledge and hence would not be, according to this definition, problem-based learning.

• What's the big deal about PBL? Posing the problem **before** learning tends to motivate students. They know why they are learning the new knowledge. Learning in the context of the need-to-solve-a-problem also tends to store the knowledge in memory patterns that facilitate later recall for solving problems.
• What skills should a student have before entering a PBL program? They should be skilled at problem solving because that skill in needed as the students try to solve the problem.
• Does using PBL develop problem solving skills? Not without explicit interventions on the part of the teacher. PBL offers an opportunity to develop the skills
• Is PBL an example of cooperative learning? It depends. If the PBL is an individual project, then it does not require cooperation with others.
• Why does there seem to be so much confusion about what is and what is not PBL? Problem-based learning, learning because you need to solve a problem, has been around for centuries. Indeed, in the stone age, people learned skills and approaches to solve problems to survive. They just didn't say to each other "Hey, you are using PBL." Similarly, I suggest that all research is PBL, although we don't call it that, we call it research. In the 1960s McMaster Medical School introduced a learning environment that was a combination of small group, cooperative, self-directed, interdependent, self-assessed PBL. Since then this approach has been called "PBL". But PBL, as I suggested previously, can be in any form where a problem is posed to drive the learning. To overcome the confusion, I suggest we use the awkward terminology of small group, self-directed, self-assessed PBL when referring to learning environments similar to the McMaster Medical school approach.

Small group, self-directed, self-assessed PBL is a use of problem-based learning which embodies most of the principles known to improve learning. This learning environment is active, cooperative, self-assessed, provides prompt feedback, allows a better opportunity to account for personal learning preferences and is highly effective.

• If small group, self-directed, self-assessed PBL is so great for learning, why isn't everyone doing it? Probably, because of fear of the unknown and resources. Using this approach requires that teachers change. Change is not easy. This change, in particular, expects teachers to change their role from being the center of attention and the source of all knowledge to being the coach and facilitator of the acquisition of that knowledge. The learning becomes student-centered, not teacher-centered. For resources, the McMaster medical school model includes a tutor/teacher with each group. The groups are tutored. Hence, there is one teacher for every group of five or six students. This is resource intensive if you do this for only one course. This approach is not so resource intensive ifthe whole program is changed to this format. But what if you want to try small group, self-directed, self-assessed PBL as part of your course? or for only one course in your departmental program? Now, one is faced with classes of 30 to 200 with only one instructor.
• How can we use this medical school model with only one instructor with large classes of 30 to 300? One answer is to use tutorless groups. Here we provide the students with the training we give to tutors; we empower the student groups to be autonomous and accountable, with the tutor's role being to monitor and hold the individuals and groups accountable for their learning.

PBL and Problem Solving

Problem solving is the process used to solve a problem. Since problem-based learning starts with a problem so be solved, students working in a PBL environment should be skilled in problem solving or critical thinking or "thinking on your feet" (as opposed to rote recall). How is this handled? In research programs, we usually have qualifying examinations in which we test the problem solving (thinking skills) of the candidates before they are admitted. In the McMaster Medical school, one of five criteria for admission is a test of the candidates problem solving skills. Regrettably, some teachers embark on PBL without either prescreening or developing their students skill in problem solving.
Doesn't putting students in a PBL environment develop their problem solving skills? Regrettably no. Giving students an opportunity to solve problems rarely develops their skill in problem solving.
Can you have problem solving skill development without using PBL? Sure. We have lots of examples. Conventionally, students learn the material in Chapter 5 of a text, and then use problem solving to solve the homework problems. Here students are using problem solving skills in a "subject-based" learning environment compared with a problem-based learning environment.

PBL and cooperative learning

Cooperative learning is a learning environment where students work together to learn, as opposed to competing with each other for marks.

Can you have cooperative learning without PBL? Sure. Cooperative learning can be used for subject-based learning. Here, you ask students to work together to solve problems,

discuss ideas, compare ideas about a concept, or do any task. You do use cooperative learning when you use small group, interdependent, self-directed PBL.

Can you have PBL without cooperative learning? Sure. Individual research or tasks in the PBL mode do not require cooperative learning.