

## **La Pédagogie par Problèmes**

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“True learning is based on discovery guided by mentoring rather than the transmission of knowledge.”

*John Dewey*

Apprenticeship is the mastery of a craft, profession, or body of knowledge attained by engagement in learning under the guidance of a master. Mastery is achieved by working on real-world problems where the relevance to the apprentice is obvious and learning takes place in a community of practice. Problem-Based Learning (PBL) is an instructional method that has strong parallels to the apprenticeship approach to learning. (Wee & Kek, 2002)

A key foundation of FORMASUP is the use of alternative pedagogies such as PBL. It is the promise of PBL that brought the University of Delaware (UD) and the FORMASUP consortium together into a partnership over the past two years. Following an inquiry and visit to UD by then-Director Jacques LESENNE early in 2001, a weeklong visit was hosted by our Institute for Transforming Undergraduate Education. The visit served to start a dialog between educators at UD and educators and administrators from the universities and schools and representatives from the trade unions and companies that comprise FORMASUP. An intensive series of workshops was delivered in the summer of 2001 and both groups of educators shared their experiences with PBL and the apprenticeship method. We are delighted to represent UD at the kind invitation of Director Jean-Paul BRICOUT and President Yves EMERY to participate in the tenth anniversary celebration.

### **Motivation for Alternative Pedagogies**

When business and industry leaders identify desirable attributes for prospective employees, our current students, the list generally includes the following elements (Wingspread Conference, 1994):

- High level of communication skills
- Ability to define problems, gather and evaluate information, develop solutions

- Team skills -- ability to work with others.
- Ability to use all of the above to address problems in a complex real-world setting.

How can we help our students achieve these goals? Studies have shown that collaborative learning is a superior approach for developing graduates with the enhanced set of skills they need after they leave formal education. Research shows that collaborative learning results in (Johnson, Johnson, & Smith, 1998):

- Academic success:
  - higher achievement, including knowledge acquisition, accuracy, creativity in problem-solving, and higher reasoning level.
- Attitude Effects
  - persistence towards goals, intrinsic motivation, applying learning in other situations, greater time on task

### **Introduction to Problem-Based Learning**

“The principal idea behind PBL is that the starting point for learning should be a problem, a query, or a puzzle that the learner wishes to solve.”

*D. J. Boud*

Problem-based learning is an instructional method that challenges students to "learn to learn," working cooperatively in groups to seek solutions to real world problems (Duch et al., 2001). These problems are used to engage students' curiosity and initiate learning of the subject matter. At its most fundamental level, PBL is characterized by the use of "real world" problems as a context for students to learn critical thinking and problem solving skills, and acquire knowledge of the essential concepts of the course. Using PBL, students acquire life long learning skills that include the ability to find and use appropriate learning resources.

The appeal of problem-based learning has several elements. Carefully constructed, open-ended problems help develop critical thinking skills. Through such problems, students encounter concepts in contextually rich situations that impart meaning to those ideas and enhance their retention. In encouraging students to assess their own knowledge, to recognize deficiencies, and to remedy those shortcomings through their own investigations, PBL provides them with an explicit model for lifelong learning (Boud

and Feletti, 1997). Through PBL, students learn how to learn, how to ask the right questions to arrive at solutions.

In addition, the group format teaches students the power of working cooperatively, fostering not only valuable communication and interpersonal skills, but also a sense of community in which diversity becomes a strength, enhancing the learning experience for all. PBL addresses the real concerns of industry and graduate schools that fresh college graduates come prepared with problem-solving skills and be able to communicate effectively across disciplines and work with others to solve problems (NSF, 1997)

The process used in PBL is the following:

1. Students are presented with a problem (case, research paper, videotape, for example). In their groups, they organize their ideas, discuss previous knowledge related to the problem, and attempt to define the broad nature of the problem.
2. Throughout discussion, students pose questions, called "learning issues," on aspects of the problem that they do not understand, and are recorded. Students are continually encouraged to define what they know and, more importantly, what they do not know.
3. Students rank, in order of importance, the learning issues generated in the session. They decide which broad questions and issues will be researched by the whole group, and which ones are narrower and can be assigned to individuals.
4. Students and their instructor discuss which resources and other materials will be needed to research the learning issues and, most importantly, where these may be found. After a period of time, in which students pursue researching their learning issues, they reconvene to discuss these issues and integrate their new knowledge into the context of the problem. Students are also encouraged to summarize their knowledge and connect new concepts to old ones.
5. They continue to define new learning issues as they progress through the problem. Students soon see that learning is an ongoing process, and that there will always be (even for the teacher) learning issues to be explored.

The instructor must guide, probe and support students' initiatives, rather than lecturing or providing easy solutions. The degree to which a PBL course is student-directed versus teacher-directed is a decision that each faculty member must make based on the size of the class, the intellectual maturity level of the students, and the instructional goals of the course. When teachers incorporate PBL in their courses, they empower their students to take a responsible role in their own learning, helping them to develop into independent lifelong learners.

Despite the advantages for improving the learning experience that PBL offers, its adoption as a mode of instruction is a change not undertaken lightly. Giving up the safety and authority of the podium can be unsettling for instructors accustomed only to a traditional teacher-centered lecture format. In addition, a lack of suitable material and problems designed for use in a problem-based format serves as a barrier to faculty who are ready to take up the challenge of PBL. The importance of faculty training in PBL and in development of an appropriate curriculum cannot be overstated.

The partnership between FORMASUP and UD serves to address the critical issue of faculty development. PBL curricular materials are being developed for the specific instructional purposes of FORMASUP and made available for use at other institutions through the PBL Clearinghouse, an online peer-reviewed database of PBL problems. The promise and power of PBL is being realized in the apprenticeship program of FORMASUP, which in turn serves as an excellent model to the global learning community. Viva la PBL!

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Institute for Transforming Undergraduate Education [www.udel.edu/inst](http://www.udel.edu/inst)

Problem-Based Learning at University of Delaware [www.udel.edu/pbl](http://www.udel.edu/pbl)

PBL Clearinghouse [www.udel.edu/pblc](http://www.udel.edu/pblc)