

# PROBLEM-BASED LEARNING – EDUCATIONAL TOOL OR PHILOSOPHY

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*The practice of problem-based learning is richly diverse as educators around the world and in a wide range of disciplines have discovered it as a route to innovating education. There are probably as many forms of PBL practice as there are practitioners. This sometimes gives rise to concern as to the validity or purity of the PBL concept. One way of classifying PBL models is to ascertain if the approach is used as a delivery method, or a way of reconceptualizing a total educational approach. The former uses PBL as an educational tool to enhance learning as a relevant and practical experience, to hone students' problem-solving skills and to promote students' independent learning skills. PBL as a philosophy aims to design and deliver a total learning environment that is holistic, student-centred and student empowering. This paper examines the characteristics of these levels of use and explores the opportunity presented by PBL as an educational philosophy to break out of conventional mindsets with regard to conventional education practice.*

## INTRODUCTION

Many writers and practitioners in education have noted the seemingly explosive uptake of Problem-Based Learning (PBL) in recent years. Educators and educational institutions from K-12 school, to further and higher education systems, covering an extensive range of disciplines, have claimed the use of problem-based learning methods in their programs. The use of PBL has also extended beyond conventional face-to-face teaching to distance learning (Ostwald & Chen, 1993; Ostwald et al. 1993; Schiller, Ostwald & Chen, 1994) and on-line delivery (Chen & Gameson, 2000).

One reason frequently cited for the adoption of PBL as an educational strategy or delivery approach is disenchantment with conventional lecture-based didactic approaches (Koschmann, et al., 1994; Shanley & Kelly, 1995; Ryan, 1997). The increasing volume of criticism against these approaches is itself creating pressure on institutions and educators to claim the adoption of PBL as a means of innovating their own educational offerings, or indeed just to be seen as part of the innovative movement.

The distinguishing features of PBL (Boud, 1985) have generally been accepted as:

- The presentation of a problem as the start of a learning process
- The presentation of learning problems in as realistic ways as possible in an educational setting
- The organization of learning processes in response to the problems
- The emphasis on student responsibility and initiative in learning
- Better accommodation of individual students' state of knowledge and experience at the starting point of learning
- More scope for integrating multi-disciplinary considerations, and
- More collaborative relationship between students and teachers in the learning process

The characteristics of an iterative PBL process are (Barrow & Tamblyn, 1980; Alavi, 1995; Ryan, 1997):

- Problem focus from the outset
- Initial enquiry and identification of learning needs
- Learning of skills and knowledge in accordance with identified needs
- Application and reflection
- Refinement and development
- Conclusion and integration of learning into a student's existing knowledge and skills

With the uptake of PBL in many different educational contexts, the classification of PBL methods has become a vexing issue. The notion of a core model or form of problem-based learning has long been overtaken by a myriad of different models with different emphases and interpretations of PBL principles. The many variables could produce wide variations in quality and in the educational objectives that could be achieved, and it is important that differences in approaches are appreciated especially when evaluating or comparing them (Barrows, 1986), or in the choice of an appropriate model to maintain educational integrity (Ryan, 1997).

The PBL "explosion" is generating concern that the concept of PBL would become confused if any educational approach that included the mention of the word "problem" was accepted as a PBL model (Alavi & Margetson, 1997). This has led to debates about what is "pure" PBL and what is not.

Camp (1996) and her colleagues, for example, have proposed that "pure" PBL involves active learning, is adult-oriented, problem-centred, student-centred, collaborative, integrated, interdisciplinary, utilizes small groups and operates in a clinical context. Unfortunately, this definition would not include the use of PBL in schools, in distance learning and on-line programs and in many non-vocational contexts.

A consequence of taking any elitist approach or emotive terms, such as "pure" and "impure", to classifying PBL approaches is that it works against one of the strongest motivators for changing educational methods, the perception of innovation. There is a danger that "PBL snobbery" could act against the very reason why most practitioners have adopted some form of PBL - to improve the quality of students' learning.

One classification approach that would be useful, particularly in evaluating research outcomes, is to ascertain if PBL is used simply as a delivery method, or as a way of reconceptualising a total educational approach. The former uses PBL as an educational tool to enhance learning as a relevant and practical experience, to hone students' problem solving skills and to promote students' independent learning skills. PBL as a philosophy aims to design and deliver a total learning environment that is holistic, student-centred and student empowering.

Others have advocated going down a similar path by distinguishing between Problem-Based Learning (PBL) and Problem-Based Curricula (PBC) (Feletti, 1993; Albanese & Mitchell, 1993). Arguably though, PBL as a philosophy goes very much further than just "an approach to structuring a curriculum" (Feletti, 1993).

### **USING PBL AS AN INNOVATION TOOL**

The form and application of "problem-stimulated" approaches (Bridges, 1992) in any educational situation is often subject to:

- The objectives of those who make the decision to take the approach
- The limitations of available resources and expertise
- The opportunities and scope for change within the subject, course or program, and
- The constraints beyond the control of those who want to use PBL in their programs

This does not mean that improvements cannot be achieved by using PBL techniques where possible. In the classification debate, it is important not to confuse poor design and implementation of PBL concepts with well-considered strategies that are necessarily customised to meet a wide range of needs, objectives and constraints.

The techniques used in problem-based learning have been widely adopted to enhance the attainment of certain educational objectives in conventional programs. These techniques include the use of:

- Problem triggers to stimulate or focus learning
- Coaching or facilitating approaches by tutors to support student learning
- Small group tutorials to facilitate student interaction and shared learning
- Learning strategies and objectives developed by students, and
- Self-directed studies to achieve individual learning objectives

What distinguishes the use of PBL techniques as a tool and the implementation of PBL as an educational philosophy is that changes made to the educational setting are generally focused on the delivery strategy, with little or no change to the existing curriculum design or assessment practices. Figure 1 illustrates this situation.

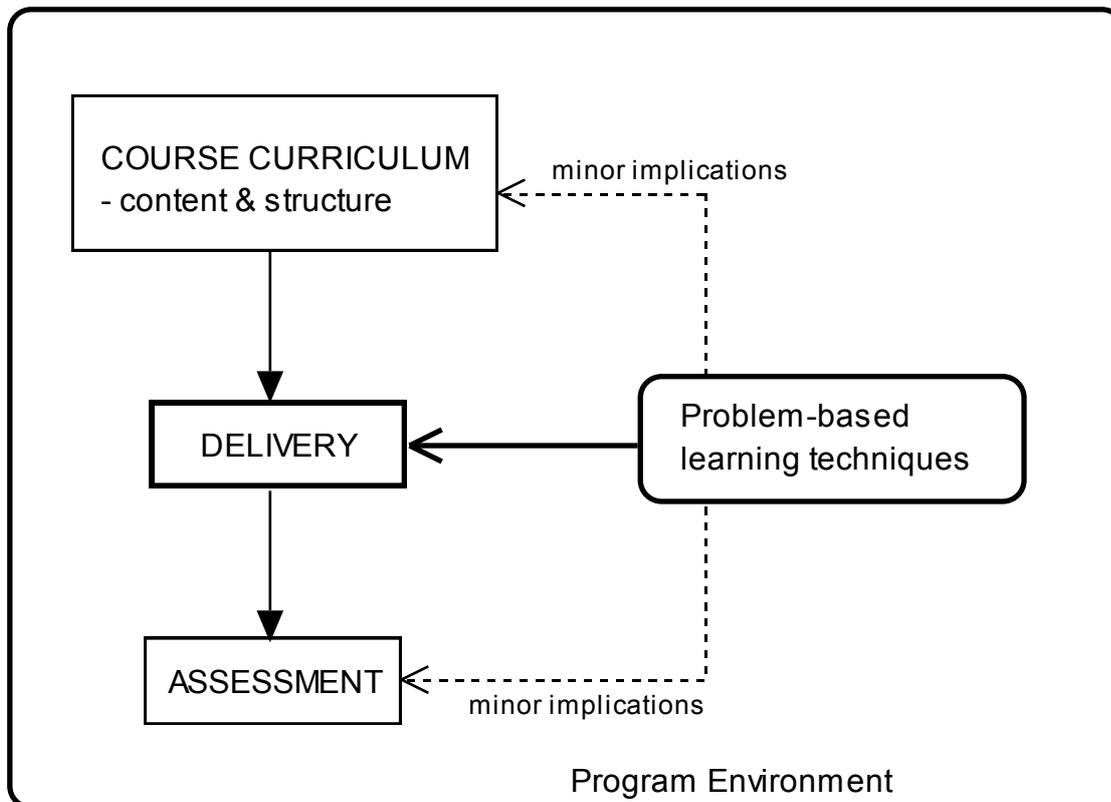


Figure 1. Using PBL as an Educational Tool

The decision to use PBL primarily as a delivery tool goes to the heart of why most educators look for innovative alternatives to the teacher-centred didactic approach of conventional educational environments. They perceive the shortcomings of conventional educational approaches in delivery methods that emphasise teaching rather than learning, passive learning roles and on having rather than using or creating knowledge (Marton, Hounsell & Entwistle, 1997).

The constraints that PBL practitioners work within are often generated by institutional administrative requirements that dictate the structure of educational programs as well as academic requirements, including assessment and teaching contact. Issues such as:

- Discipline-specificity of subjects
  - Prescribed content of curricula
  - Modular structure of programs
  - Prescribed sequence of studies
  - The size of component units of study, and
  - Prescribed assessment processes (eg examination based)
- can be obstacles to:
- Interdisciplinary integration
  - Developing problems of sufficient scope to drive in-depth exploration of learning objectives
  - Adopting a wide range of alternative learning activities to the conventional didactic lectures, and

- Developing and implementing assessment processes that are appropriate to the PBL process

Sometimes members of faculty may have different ideas about appropriate educational methods and those who wish to are only able to implement PBL techniques within the subjects that they have control over. There may be scope, by deconstructing the objectives of existing discipline-based subjects and reconstructing them as theme-based modules, to modify curricula within prescribed program structures to achieve some extent of integration but this often depends on the cooperation of the faculty and the rigidity of the existing structures and administrative processes.

Within these situations, the adoption of some PBL techniques for delivery of the existing curriculum may be all that is possible and the best innovative solution achievable. The claim of programs using PBL techniques as a tool to be considered as PBL models is legitimate if this facilitates the achievement of PBL objectives including (Barrows, 1986):

- The development of problem-solving ability
- The development of self-directed learning ability
- The development of knowledge, skills and attitudes within appropriate contexts (including professional practice)
- The encouragement of motivation for learning

The difficulties of using PBL as a tool within an educational environment that remains predominantly traditional or where delivery approaches are in transition are significant, (Margetson, 1991; Kenley, 1995; Felder, 1995; White, 1996)) and should continue to be subject to research and evaluation within the PBL framework.

## **USING PBL AS AN EDUCATIONAL PHILOSOPHY**

The development of PBL from simply an educational approach associated with a set of principles, processes and objectives to a more fundamental educational philosophy is underpinned by links to a number of theoretical frameworks (Ryan, 1997; Camp, 1996) including adult learning (Knowles, 1980; Brookfield, 1993; Boud & Griffin, 1987), experiential learning (Boydell, 1976; Kolb, 1984), and constructivism (Bruner, 1966; Savery & Duffy, 1995).

The philosophical principles of PBL that are consistent with these theories include:

- Student-centredness of the learning environment
- Student-empowerment in the learning process
- The development of lifelong learning skills
- The encouragement of independent, active and self-directed learning

There are significant implications of these principles, for the holistic consideration of the educational environments that students are placed in, including the design and structure of curricula and the adoption of appropriate assessment processes. Figure 2 illustrates this situation.

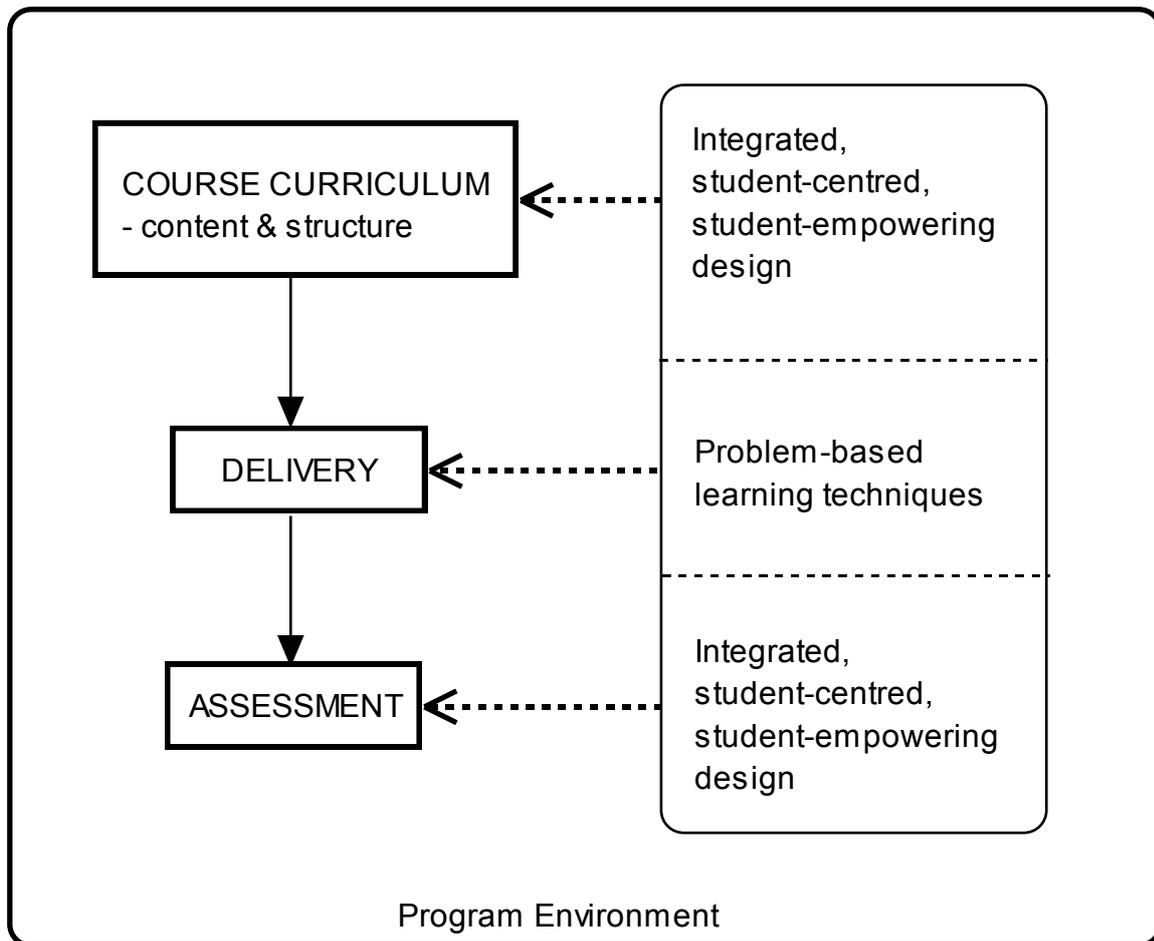


Figure 2. Using PBL as an Educational Philosophy

A student-centred, learner-empowering PBL environment recognises that learning is a personal, active and lifelong experience and can be conceptualised using a framework that considers holistically:

- The curriculum content and design (what is to be learnt)
- The teaching-learning approach (how is it to be delivered and learnt)
- Assessment (what is the role of assessment and how is it to be implemented)

This framework represents the interface between the learner and educator. It does not ignore the fact that there are other important considerations in the design and delivery of the educational experience such as accreditation and administrative requirements and institutional constraints. Important as these may be to academics and administrators, they should essentially remain a step removed from the interface and invisible in the educational experience of the learner.

Student-centred and learner-empowering PBL curricula need to be relevant and meaningful to the individual learner, provide motivation for learning and facilitate the development of independent and inter-independent learning. Curriculum content and assessment represent two aspects of educational programs that tend to be influenced by considerations that are not usually student-centred and learner-empowering.

Curriculum content is usually a combination of what is required for accreditation and what the faculty decides should be included. Traditionally this is presented within discipline-specific domains and based on current discipline knowledge and focuses on concepts, factual information and research and information manipulation skills relevant to particular subject areas. The growth in knowledge in most disciplines means that no curriculum can offer more than a sample coverage of existing knowledge. This, combined with an increasing rate of knowledge obsolescence in professional domains, means that content-based education can only serve short-term learning needs (Chen, McGeorge & Ostwald, 1992).

Roberts (1995) proposed that traditional content-based curricula represent a “just-in-case” approach to learning while lifelong learning which focuses on learning to learn represents a “just-in-time” learning approach. Lifelong learners would regard learning as a cumulative process, with present knowledge serving as the basis for future learning. They, in terms of constructivist theory (Brown, Collins & Duguid, 1989; Honebin, Duffy & Fishman, 1993), would relate new information to a broad general framework and continually integrate new knowledge into that framework.

A static content-based syllabus is no longer adequate in preparing students for a fast-changing world. Learner-empowering education is not just about knowledge acquisition, especially when knowledge obsolescence is an issue. Education for change is equipping learners with core-enabling knowledge, skills and attitudes for lifelong independent learning. Curriculum content should be driven by outcomes necessary for effective performance at work and in life, and lifelong learning skills.

Curriculum content, in terms of PBL philosophy, should be student-centred and facilitate the development of lifelong learning skills. One way of conceptualising student-centred curriculum content in PBL is to distinguish between:

- Foundation knowledge, which is the body of core concepts that individual students can use to build a cognitive framework for ongoing independent learning, and
- Contextual information used to give real world meaning to the learning experiences of the students. Contextual content would need to be reviewed regularly to maintain currency and relevance and be viewed by both students and tutors as facilitating the development of individual learning

Assessment can be a powerful influence on student learning depending on what it is used for and how it is used. The influence of assessment on the whole educational process is often underestimated and assessment methods are often destructive and manipulative of the ways students learn (Docking, 1987). There is often confusion as to the reasons for assessment leading to inappropriate methods which then impact on student learning.

Assessment in higher education is driven by institutional as well as educational demands and therefore needs to serve formative, summative and normative purposes. There is a need to clearly distinguish between testing and examinations for the purpose of selection, evaluation for the purpose of grading and ranking and assessment for the purpose of providing feedback to learners and educators. Assessment processes also need to be relevant, valid, reliable and convenient.

Assessment needs to be an integral part of a learner-empowering educational strategy. The purposes and forms of assessment should be clearly linked to the learning process and the

outcomes of learning. The traditional educational attitude towards assessment reflects an approach of screening and selection through inspection rather than designing the educational process to encourage individuality and excellence. Examinations are a fundamental part of the traditional educational approach and serve the primary purpose of certifying whether a student has met minimum criteria, usually of recall, understanding, and specific skills mastery, generated by content-based curriculum. The examination-based assessment system works by identifying student failings with respect to learning and marks students down for errors and omissions with respect to preconceived criteria rather than encouraging and recognising individual student development and achievement. This approach has a powerful effect on student learning approaches, encouraging shallow and strategic learning rather than deep learning strategies (Newble & Entwistle, 1986).

Learner empowerment can be encouraged by focusing on recognising the excellence of individual learning outcomes rather than prescribed knowledge content, and by ensuring that learning experiences are enriching, relevant and holistic, so that there is motivational reinforcement of the learning effort and development of higher order skills and self-directed learning. The assessment process should provide feedback for the learner and the educator for continual improvement - with respect to the learner's performance and to the learning environment which is provided (Roberts, 1995). Assessment during the learning process should therefore be formative and not summative. The particular learning process only ends when the learner has achieved the desired outcomes and at that point, the assessment process is used to credential the learner for the achievements.

It is appropriate for learners to be involved in assessment in student-centred and learner empowering PBL environments. Carefully designed instruments and processes could include self-assessment, peer assessment and reflection, competency-based assessment as well as faculty-driven evaluation (Chen, Ilett & Kingsland, 1998; Conway, Chen & Jefferies, 1999). The assessment of complex and individual learning journeys and outcomes is necessarily subjective but the difficulties of subjective assessment can be overcome by using panels of qualified and informed assessors (Kingsland & Cowdroy, 1990).

## **CONCLUSION**

The classifying of PBL approaches is important for a variety of reasons including the valid comparisons of evaluations and research, for understanding and adopting appropriate and effective models to meet particular educational objectives. Educators who simply wish to innovate delivery practices adopt PBL techniques as a tool while those who use PBL philosophically to reconceptualise their programs as student-centred and learner-empowering environments see PBL as a paradigm shift requiring fundamental changes in curriculum, delivery and assessment design as well as the conventional teacher/discipline-focused mindsets of institutions and faculties.

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