A REVIEW OF DEVELOPMENTS AND ISSUES IN PBL

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ABSTRACT

Problem Based Learning (PBL) is a student centred educational method characterized by the use of 'real-world' problems as a context for students to acquire knowledge. The problems in PBL are designed to challenge students to develop effective problem-solving and critical thinking skills. This approach produces independent students who can continue to learn on their own & in their chosen careers. In PBL, teachers act as facilitators to guide the students in their problem solving efforts. The teacher poses a problem and students are encouraged to work together to define the problem and determine the best fit solution. Students are assessed on their findings by a presentation or submission of a portfolio assessment. PBL enhances learning by providing a highly motivational environment for acquisition of knowledge; students are given more responsibility for their education, it adds variety to classroom learning experience and caters for students with differing learning styles. There is considerable interest in the advantages of problem-based learning over traditional approaches. In this review, an examination of the developments and issues pertaining to problem-based learning and its educational objectives are discussed.

Keywords: PBL, student centered, curriculum, assessment

INTRODUCTION

Problem Based Learning (PBL) is a term used within education for a range of pedagogic approaches that encourage students to learn through the structured exploration of a problem. The concept of PBL has its roots in Socratic inquiry and centuries-old apprenticeship training. Socrates did not lecture as much as he moderated and directed questioning. It can be observed in The Republic by Plato (360 B.C.E.) that Socrates guided his students through inquiry to answer their own questions, search out answers to problems, and relate their knowledge to life applications (Bayard, 1994). In graduate medical school programs, PBL was initially designed when instructors noted that young physicians were graduating with a wealth of information but without the necessary problem solving skills to use that information wisely (Gallagher et al., 1995). In 1969, a medical school was founded in Ontario with a unique educational philosophy, the "McMaster philosophy," which has evolved into the educational strategy known as problem-based learning (Bayard, 1994).

PBL is different from other forms of learning, because in 'traditional' curricula, teachers tend to start by providing information, and students have to use the information to solve problems. In the PBL approach, the problem comes first and students both define the problem and gather information to explore it. Content is introduced through process of problem solving, rather than problem solving *after* introduction to content. However, this PBL methodology does not equip students with sufficient basic knowledge and facts that

may disadvantage them as compared to students who have gone through the traditional curriculum.

In PBL, students work in self-directed groups and are empowered to take an active and systematic approach to defining and exploring a problem. For this approach to be effective, the number of students in each group should be limited and there should be a good mix of students with different capabilities and knowledge. In order to further broaden their skill sets and research abilities, students should be encouraged to use e-learning resources. The problem chosen by the teacher should be of good quality, ambiguous, interdisciplinary and requires meta-cognition whereby students are not expected to reach the 'right' answer. PBL problems may not have right or wrong answers. This technique is characterised by student-centred, collaborative and context-specific learning (Ward & Lee, 2002)

The central concept to PBL is that students will learn content as effectively as they would through "traditional" lecture by attempting to solve 'real-world' problems. Problem-based learning has two distinct goals: to learn a required set of competencies and to develop problem-solving skills that are necessary for lifelong learning (Engel, 1991). As problems are central to this instruction format, their development is a crucial component of a PBL program. Tchudi and Lafer (1996) described good problems as having the following characteristics. They (a) confuse just enough to provoke curiosity and provide a reason for learning, (b) provoke thought on new things in new ways, (c) help students discover what they do and do not know, (d) ensure that students reach beyond what they know, (e) create a need and desire for skill and knowledge, (f) lead to understanding the relationship of a procedure to the problem which makes the procedure sensible, (g) naturally lead to interdisciplinary inquiry, (h) build strong communities of learners; and (i) lead to cooperation in the strongest sense that is based on the will and desire to succeed rather than a set of dictated behaviours that are advocated for the sake of politeness.

Tchudi & Lafer also posited that a quality problem should have a visible product or presentation that is viewed by an outside audience. In lieu of all these criteria, developing good problems pose a challenge for educationalists. It can be time consuming and utilises abundant intellectual effort. Lecturers may have to go for more staff development workshops and be involved in more teamwork to encourage knowledge sharing. This development is necessary to overcome the challenge of developing good problems that befit the characteristics of a quality problem.

There are a number of different approaches to practice PBL. There is the 'authentic' PBL which sticks closely to a particular set of principles and processes first systematized by medical educationalists at McMaster University. However, the authentic PBL has been modified over the years and in different educational institutions worldwide. This evolution is because educationists and policy makers opine that students are not equipped with sufficient knowledge base prior to solving complex "real-world" problems. Therefore, the 'hybrid' PBL approach was created, whereby modifications have been carried out to 'hybridize' PBL with conventional teaching methods. This hybrid approach is more effective as students are equipped with the knowledge base before they are given problems to solve. As a result, students would naturally feel more confident and knowledgeable about their respective subject areas.

Implementation of PBL

The PBL educational model is both a curriculum and a process. The curriculum consists of carefully selected and designed "trigger" problems or scenarios. The process would be the commonly used systemic approach to resolving problems. One way of using PBL would be to give students a focused research problem that has been carefully prepared. The students are organized into small groups of 3-5 members, where they are encouraged to work together to facilitate each other's learning. Student-student interactions are restructured so that they are "cooperative" instead of "individualistic". Teachers act as facilitators & mentors, guiding the students in their problem solving efforts. A chairperson and notetaker can be appointed from the group and the problem is analysed and 'discussed' among members. Hypotheses are formed and the resources needed are determined. Specific research tasks are defined and divided up among members. Students then search for and gather information and perspectives in relation to their research problem. They would then pool their respective findings, evaluate hypotheses and possibly reformulate conclusions. The solution would then be presented and the problem de-briefed (Ruth L., 2006).

Assessment Techniques

Assessment provides a diagnostic tool to ensure students are progressing towards their learning goals. Too often there is a break in learning where teaching ends and these then follows an assessment.This encourages students to get by on their memorization skills & continue with passive participation.

Traditional letter grades are not applicable for PBL assessment, especially when students are presented with 'real-world' problems that "experts" themselves have not been able to satisfactorily resolve. The ill-defined problems of PBL do not have solutions that can be written in an answer key.

An appropriate PBL assessment strategy would be students' documentation of their intellectual journeys (Gallagher et al., 1995; Stepien et al., 1993; Tchudi & Lafer, 1996). Students can prepare a portfolio assessment that includes notes, in-process commentaries, articles they have read, and discussions or evolution of their ideas preparatory to formulating and reporting their conclusions. Another possible assessment tool would be concept mapping (CM). CM is a metacognitive tool that was developed for a study of the changes in conceptual understanding of science over a 12-year period at Cornell University (Novak, 1990). The concept map shows relationships among concepts and organizes knowledge effectively. It can also assist teachers to identify errors in student learning. In addition, a conventional assessment method would be the demonstration of presentations. Students present the components of work they have contributed to the overall solution. They could explain on plans, strategies and observations that led to their findings. This also enhances their communication, presentation, time management skills. These skills are deemed pertinent as employers and business leaders are citing the need for workers with excellent communication and writing skills.

Barriers to Problem-Based Learning

To effectively implement PBL, teachers have to adopt new roles that are frequently very different from those of their past. In the 'traditional' curriculum, the teacher is the "expert" in dispensing knowledge. In PBL, the teacher selects the problem, presents it to the students, and then 'facilitates' student research and inquiry. The teacher functions as a mentor and is not in total control, but relegates the control to students in the problem-solving process (Ward & Lee, 2002). Some teachers find it difficult to teach an educational pedagogy that they themselves have not experienced. Nonetheless, the educational landscape is changing at such a fast pace. Technology has such a pervasive role in the field of education.

One of the barriers to PBL is the lack of prepared materials for classroom instruction. Few training materials are available. Present curriculum guides and textbooks do not contain the variety of sample problems or assessment tools needed to support this methodology on a broad scale. Most assessment materials that are available are knowledge based. The philosophies supporting PBL are well established, but the "how tos" are in short supply (Burruss, 1999; Gallagher et al., 1995). Few teachers have the time or the motivation to prepare all the new materials required for classes. As it is, they face time constraints to finish their syllabi and improve test scores. There is also a perception that PBL may not be able to cover as much curricula as compared to the traditional learning setting. Many teachers do not believe they can justify the time necessary for PBL as reported by Meier et al. (1996).

In addition to that, another problem with the implementation of the PBL approach is that students are not familiar with this new concept of teaching and learning. They come from educational institutions that are based on the traditional classroom teaching. Hence, it may add to the stress levels of students if they have to learn in an entirely new approach. Parents may also question this new curriculum implementation as they are paying high tuition fees and lecturers are playing roles merely as *facilitators* and not dispensing knowledge as in a traditional teacher-centred approach. This tension arises because parents originated from a traditional classroom setting and have not themselves experienced this new way of curriculum implementation.

There are concerns that it would be difficult to assess students with the PBL approach. It may be true to a certain degree that a traditional exam or topical test maybe a better gauge of students' knowledge, understanding and ability to apply knowledge learnt, as marks are obtained based on a vetted marking scheme. However, assessment strategies such as portfolios, concept maps and presentations can also be equally effective if the facilitator gives marks based on a rubric system and makes it clear among his or her students the expectations of the rubric. This is effective because a scoring rubric contains criteria and standards linked to the learning objectives of the topic.

CONCLUSION

Although there are a few issues revolving around the efficacy of PBL as an instructional methodology, these problems are not insurmountable as PBL is being practised all over the world in different educational institutions such as Tokyo Women's Medical University, University of Sheffield and Harvard Medical School (Matsui et al., 2007; Donner, R. & Bickley, 1993;). The fact that it has widespread implementation shows that it can be made an effective and efficient methodology to keep abreast with current advances in education.

An '*authentic*' PBL teaching environment can be difficult to produce; moreover, there are constraints to conduct PBL for some subjects. Hence, modifications have been made which 'hybridize' PBL with traditional methods to retain the values of conventional teaching methodologies. Adding an occasional "problem" to the traditional class will add variety to the classroom learning experiences while maintaining educational integrity. In addition, PBL lowers boredom and stress levels in students as student participation is high and they take ownership for their own learning. Although there maybe barriers and implementation issues revolving around PBL, efforts by teachers to give PBL a try would be worthwhile as it provides students with greater exposure to cooperative learning, problem solving & critical thinking skills which are all critical for the workforce of the future.

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