

Toward the Successful Implementation of Problem-Based Learning at the University Level

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The knowledge-based society increasingly demands professionals possessing essential knowledge, and the ability to use this knowledge effectively in their work settings. In response to the requirement for these professionals, PBL is a promising educational method. This paper suggests an educational development program for faculty to implement problem-based learning(PBL). To implement PBL at the higher educational level, there is a need for a systemic approach. First, a well-designed educational plan for PBL is necessary. Before implementing PBL, both the instructor and the students should be prepared. Faculty members should be well informed on the characteristics of PBL, effective tutoring or facilitation skills, and how to design problems reflecting features of their own academic subject areas. Students also have to know the characteristics of PBL. Both of these groups need to be trained through workshops rather than through lectures. Second, a phase of design and implementation of PBL is necessary. PBL methods may seem to be intuitive and even unstructured because a problem is, in nature, unstructured and authentic. However, a closer look at PBL reveals that it is complex, carefully designed, and highly structured activity. Therefore, if it is poorly and incompletely designed, PBL can be a frustrating and exhausting experience for students and faculty members. Well-designed PBL can be an exhilarating and rewarding experience for both of them. Third, a phase of sharing PBL experiences is important: faculty members who have implemented PBL are required to share their experiences to help others enhance tutoring skills, and acquire practical information of students, contents, and what happened during PBL, and to develop PBL model in a specific domain. Based on the developed PBL model in a specific domain, PBL can be expanded and stabilized at the university level.

Keywords : Problem Based Learning, Educational Development of PBL.

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Introduction

Knowledge has become the major force in society. In order to be successful in today's dynamic and competitive society, the use of existing knowledge and the development of new knowledge becomes a prominent prerequisite for solving the complex problems in force. For education, this prerequisite implies a growing need for graduates who are able to reason with and apply knowledge to efficiently identify and resolve complex problems. In addition, functioning as part of a team and working together to keep knowledge up to date is considered to be another key issue in education (Hmelo & Evensen, 2000). In order to cope with social challenges and their educational implications, the use of problem-based learning approaches in higher education has been promoted by many educators (Arts, Gijsselaers, & Segers, 2002). Problem-based learning is defined as students in small teams exploring a problem situation and through this exploration being expected to examine the gaps in their own knowledge and skills in order to resolve or manage the authentic situation with which they are presented (Barrows & Tamblyn, 1980; Savin-Baden, 2003).

Strong interest and practical application of problem-based learning constitutes mainstream research in schools of medicine at the higher educational level. Recently, many of Korean medical schools have converted their curricular into PBL curriculum to line up with the foundation of a medical graduate school. In other fields of school such as schools of engineering, schools of business, and law schools, problem-based learning is being applied and this trend is appearing in universities in general.

In order to implement problem-based learning, both the instructor and the students should be prepared, particularly the instructor. Supports for the faculty to motivate and implement problem-based learning in universities are provided in a couple of ways: education to offer information relating to PBL and its process, and incentive. Regarding successful problem-based learning implementation, practical educational programs introducing problem-based learning rather than incentives are of significance. To date, many education programs available have been executed in

the format of an unsuccessful course such as a workshop or a crash course: these programs have appeared to be insufficient for teaching staff how to put problem-based learning into practice in their classes.

To implement problem-based learning in higher educational level, there is a need for a systemic and systematic approach. This study suggests an educational development program for faculty (and students) to implement problem-based learning. The study examines how, when, and what contents will be presented in those situations.

Steps toward the Implementing PBL at the University Level

Barrow's research(1994) revealed that universities that successfully develop problem-based learning curricula have a number of factors in common. First, in almost all cases, the dean(especially at medical schools) was either a protagonist for change or made it clear to faculty interested in developing such a curriculum that he or she would provide endorsement and support for a pilot project or a curriculum in problem-based learning. Second, there was a dedicated group of faculty who recognized that educational change was needed and were willing to work towards developing a problem-based curriculum. Third, successful programs implemented an effective strategy for educating faculty as a whole concerning problem-based learning. In the case of Korea, these important factors for successful problem-based learning have generally proved to be working in a similar manner. Educational leaders who are well aware of the significance of problem-based learning in some universities employed teaching faculty for implementing problem-based learning, and converted curriculum into problem-based learning curriculum encouraging teaching faculty to implement problem-based learning. In these cases, most of teaching faculty was provided with information and indirect experience through a workshop or a crash course.

A two or three hour crash course enables faculty to obtain basic information, but is not sufficient to implement problem-based learning. Extensive information on problem-based learning exists about definitions, objectives, the process of problem-based learning, and the roles of tutors and students(Barrows, 1996). However, few of these resources seem to guide with ease the teaching faculty within a different field of research and classes. In order to successfully implement problem-based learning, specific educational activities are needed as follows.

The Preparation Stage

Both faculty and student should be prepared to implement problem-based learning. The faculty members who serve as facilitators and activators for more than one PBL group or who teach relatively inexperienced learners need to be prepared(Duch, Groh, & Allen, 1996), as well as students who bear the responsibility for the PBL process and their own learning. Therefore, the educational method and content for faculty and students can be presented as follows:

Preparation for faculty

The education for faculty who want to implement problem-based learning is divided into four sections. The first section contains the fundamental properties of problem-based learning. Every school with a problem-based learning curriculum recognizes that the skill of the tutor is central to the success of the method. Thus, adequate training for this role is crucial to problem-based learning success. However, simply understanding the role played by the teachers is insufficient: the teachers need to understand the philosophy and objectives of problem-based learning, as well as the importance of learner-centered learning. Teaching faculty who do not fully understand problem-based learning, or lack training, tend to mislead students (Barrows, 2000).

First, the major features of problem-based learning should be provided clearly to novice teaching faculty to problem-based learning with its definition, objectives, and process, including the teachers' and students' roles in terms of problem-based learning. In case of what is called “top down” implementation of problem-based learning, in which curriculum involve the process of converting into problem-based learning curriculum from the top level of educational leaders, teaching faculty who are supposed to play the role of “tutor” are required to be trained and to understand thoroughly the roles of learners and teachers. Short-term workshops or programs appear to have difficulty providing fundamental insights into the purposes of problem-based learning and into how problem-based learning works. To address these needs, practical and systematic educational programs are required.

Second, training programs should provide the opportunity to experience the process of problem-based learning. Trainees should be able to become involved in each procedure and step of problem-based learning. According to Sage(2001), the most effective way to develop problem-based learning is to teach and learn through problem-based learning. It is desirable that teacher learners experience for themselves the process of solving problems related to problem-based learning from the learners' perspective.

Third, training programs should provide skills and strategies on how to tutor learners. The success and failure of a problem-based learning curriculum lies dependently on the effectiveness of tutors and their preparation. According to Barrows(2000), a tutorial session requires teaching faculty to understand thoroughly the roles of tutor, and preparing and acquiring these skills in practice: to observe, manage and intervene in student learning to ensure that the authentic problem-based learning education objectives are met. Effective and skillful tutors assist the students in acquiring the reasoning or problem-solving process, building a knowledge base, developing an appropriate attitude toward self-directed learning, self-regulating their own learning, and enjoying their learning by encouraging them to hypothesize, justify, experiment, and question their reasoning processes.

Finally, the education program should provide information on how to design authentic problems. The most important and critical factor is designing and developing the problems to be presented to and solved by the students in the process of learning (Jonassen, 2000). However, in real situations, new teachers experience significant difficulty when designing problems for problem-based learning(Weiss, 2003). Hence, it is desirable to provide opportunities to develop awareness and understanding of the characteristics of problems in problem-based learning, to experience various problems, and to collaborate with participants designing and developing real problems. In order to help design problems effectively, the target audiences for educational programs need to have common teaching areas or research interests so as to collaborate amongst themselves and to complete designing and producing real problems immediately after the program.

Preparation for learners

For the successful implementation of problem-based learning, preparation is required from the learner's side. The learners' preparation may be categorized into two phases: the features regarding problem-based learning in nature, and the process of problem-based learning.

First, the major features of problem-based learning should be taught to learners. Without understanding the rationale for problem-based learning, learners may feel overloaded and complain about bearing the responsibility for the process of learning, which learners sometimes regard as burdensome compared to the traditional way of learning in a teacher-centered class. In addition, learners may not accomplish the goal of learning due to a lack of understanding of the process of problem-based learning. Hence, learners need to be clearly introduced to problem-based learning curriculum, and to be taught the process as well as the teacher's respective roles and responsibility.

Second, preparation helps learners to experience the process of problem-based learning. The successful implementation of problem-based learning depends on the extent to which the steps are implemented; therefore, easy and interesting exercises

should be prepared. A general orientation for problem-based learning is able to provide students with an understanding of the features of problem-based learning and to experience its process as a unit of the school at the university. A separate orientation is needed by a teacher in practice in order for students to conduct problem-based learning tasks in a class. It is strongly recommended for students to try a test case prior to carrying out the main case or problem in a class (Chang, 2005). However, at the beginning of a course, the orientation for problem-based learning will require some time and effort from the instructor. Thus, it is desirable for education development units to hold programs during vacation periods or at the beginning of the term. Prior to a course, orientation on the procedure seems to be effective when targeting either the entire student body or just those attending the problem-based learning class.

The Design and Implementation Stage

In this phase, the following basic preparation programs for problem-based learning help the teachers design and implement their own problem-based learning classes. At first glance, the problem-based learning method seems intuitive, casual, unstructured, or even inefficient; however, when closely examined, it is complex, carefully designed, and well structured. Thus, if the method is poorly designed, problem-based learning curriculum can be a frustrating and exhausting experience for both students and faculty. On the other hand, if it is well designed, a problem-based learning curriculum can be an exhilarating and rewarding learning experience for both of them (Barrows, 2000). Therefore, faculty should carefully design and implement problem-based learning in order to achieve its objectives. Chang(2005) developed a design model of problem-based learning based on a literature review and a qualitative case study guiding the problem development and tutor's activities that are the most important. Faculty should understand the characteristics of problem-based learning and their subjects in the preparatory stage, and then, analyze, design, develop, implement, and

evaluate during the problem-based learning course in a similar manner to the general instructional design process. However, the design model of problem-based learning is differentiated by how it separates and overlaps the 'design' and 'implementation' parts. Through implementation, authentic student needs are identified and reflected in the design again. In other words, the design should be a mirror of the reality upon implementation. Based on these properties, education programs should be conducted in this phase as follows.

First, education program should involve contents of instructional design including the procedure of analysis, design, development, implementation and evaluation, a necessary process for any kind of teaching method. Some misunderstanding exists that problem-based learning is a ill-structured curricular as it is not well structured (Barrows, 2000), and thus it does not require the process of instructional design. In practice, as a matter of fact, a systematic design process is needed for authentic problem-based learning.

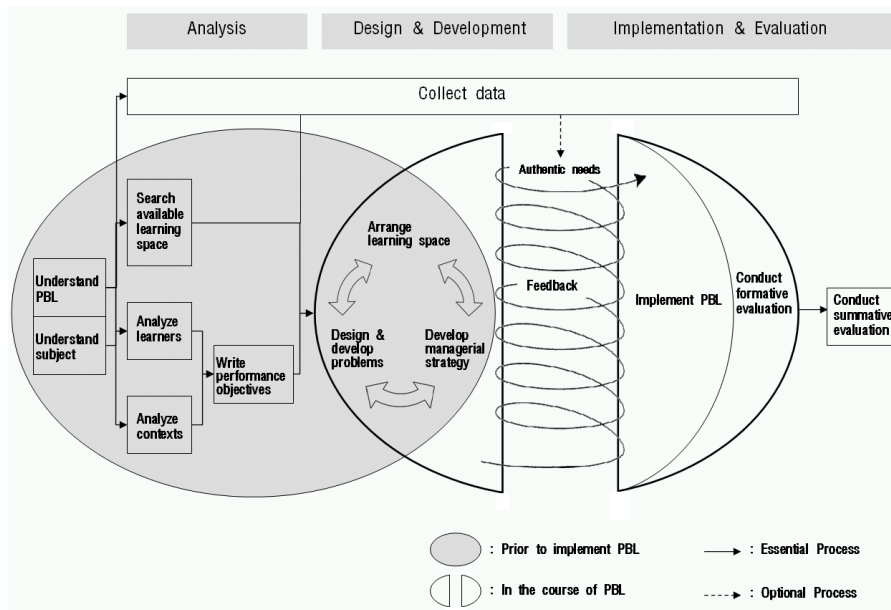


Figure 1. Reality Mirroring Design Model of Problem-Based Learning

In many cases, teaching faculty tend to plan to run problem-based learning class by themselves. They may ask for other professional aids to replace the role of tutor and instructional designer. Generally, a line of demarcation is drawn between the problem developer and the tutor; however, an instructor who wants to implement problem-based learning has to develop problems and facilitate his students' teams, except at a school of medicine. Thus, faculty who want to implement PBL should be able to analyze contexts, students' characteristics, and learning environments as a SME and instructional designer. This competency enables the instructor to handle problem-based learning classes professionally and competently.

Second, education involving design and development problems in problem-based learning is required at the stage of preparing for problem-based learning. Moreover, experience in developing problems is critical in order to design and development appropriate problems. Well-designed problems usually come from the experience of teaching through problem-based learning; thus, it is desirable that problems be designed through workshop and tutorial training in the process of designing and implementing problem-based learning.

Finally, tutorial training through educational programs for teachers are necessary in order for them to be effective tutors. Tutorial training should focus on effective means to guide learners in answering and solving the problems presented. Even though there is a list of steps for effective tutors to follow, effective tutors are able to make learners involved in the procedure of solving the problem. Tutors become skillful and effective as practical insights accumulate through training and field experiences. In his case study, Barrows(2000) suggested that video-taping the tutor's role in real classes may provide feedback of good value, and it is recommendable that teachers new to PBL and PBL experienced teachers should be tutored on effective tutoring.

Sharing Stage of the PBL Experiences

Savin-Baden(2000) has made the criticism that the growth of interest in problem-

based learning has not satisfied the expansion of problem-based learning in practice because those teaching faculty experienced in problem-based learning have not been sharing information relating to learners and teaching in the context of problem-based learning with teachers new to problem-based learning. Barrows(1996) suggests that teachers' experience in problem-based learning and observation of problem-based learning are of importance in order to design and manage problem-based learning in practice. Barrows also argues that it is more effective and desirable that the teaching faculty observe the problem-based learning classes of their own students' rather than those at any other school. Sharing experiences in managing problem-based learning curriculum and learners' characteristics among teaching faculty in problem-based learning practice as well as with those new to problem-based learning is important. That is, teachers are able to improve their tutorial skills by sharing information involving learners, contents, and various problems. Furthermore, teachers from the same research areas are able to create the fundamental environment for developing a model reflecting specific features in their own research fields. Such sharing could be made available through workshops, presentation, microteaching, observation, and teaching portfolios.

Development Stage of PBL Model in a Specific Domain

As shown in Figure 2, problem-based learning has been developed from physicians' clinical reasoning and the process of solving problems, and it can be applied into a variety of domains such as engineering schools and law schools. However, problem-based learning models need to reflect and represent the unique features of specific research domains. Regarding problem-based learning models from different research domains, it is preferable to develop unique and specific models for each research domain while problem-based learning is being implemented rather than developing these models before their implementation with a view to referring to teachers' experience in practice.

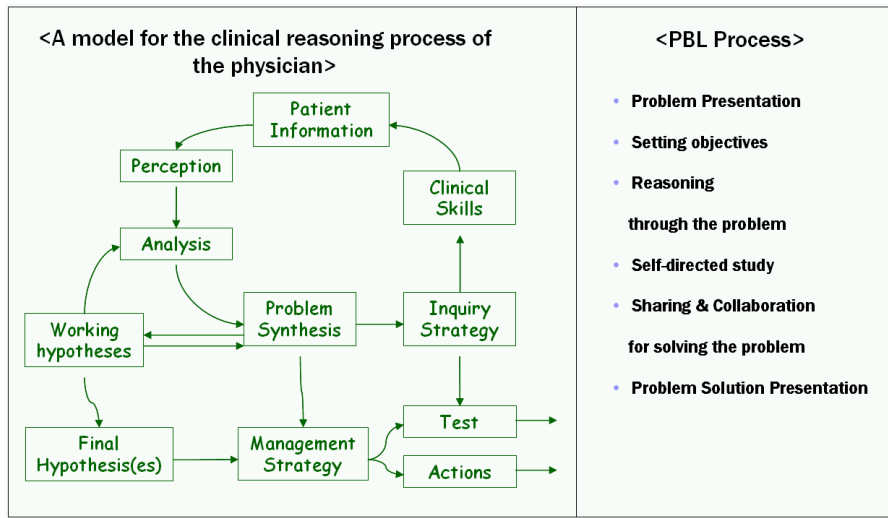


Figure 2. Comparison of the clinical reasoning process and PBL process

Conclusion: For the Extensive Implementation of PBL

Extensive implementation of problem-based learning may be available on the basis of revised models depending on the specific research domain and for its successful implementation; sharing experiences, as mentioned above, should be available through various kinds of workshops, presentations, and teaching portfolios. The current shift towards problem-based learning within higher education suggests that staff and educational development needs to be a central component in any problem-based learning implementation strategy. Systematic supports are required to successfully implement problem-based learning. Suggestions previously stated should be ways of executing faculty and educational development programs and providing mechanisms for the continuing support of staff as they implement problem-based learning. Furthermore, in order to implement problem-based learning successfully, educational development units should play a key role.

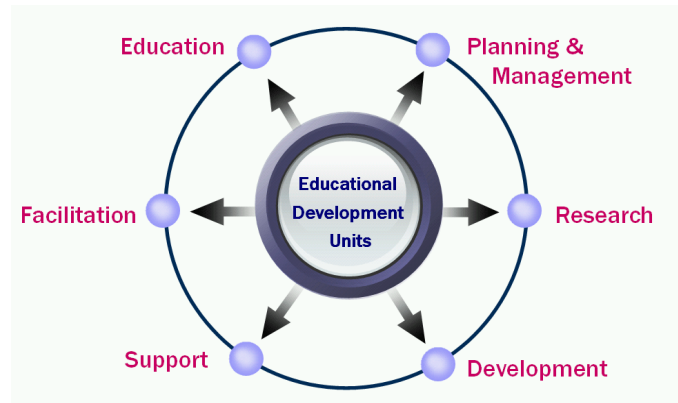


Figure 3. The Roles of Educational Development Units for PBL

Figure 3 presents the roles that educational developments units(for example, the Center for Teaching and Learning, Lab of Medical Education, and the Center of Engineering Education for Accreditation) are expected to take. These units have to educate, facilitate, and support both faculty and students, and at the same time have to plan, manage, and research in order to develop "New Problem-Based Learning Models" suitable for each specific domain.

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