

Mini Review

Problem based learning (PBL) in medical education to facilitate student learning

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ABSTRACT

Life-long learning and the demand for continuous development of skills, knowledge, and attitudes needed in working life have resulted in a call for new ways to organize learning. The knowledge gained in education becomes quickly outdated and loses its value in real-life scenarios. The skills and knowledge needed in working life cannot all be taught during formal schooling and training. Working life requires multidimensional professional skills with a problem-solving approach and abilities for continuous learning via independent knowledge acquisition and its

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practical application. Problem-based learning is considered an instructional approach that may solve some of the important issues of medical education, such as the difficulties encountered by students in using the knowledge gained in a clinical setting. Problem-based learning (PBL) courses start with the problems rather than with the exposition of disciplinary knowledge, so that medical students are trained to deal with difficult situations in the future, preparing themselves to become active, independent learners and problem solvers, rather than more or less passive recipients of information. This review is undertaken with an objective to describe innovative problem-based learning and teaching concepts to help facilitate the better learning of real life situations in the classroom and enhance critical thinking among medical students.

Keywords: Facilitator, Problem based learning (PBL), Students

INTRODUCTION

The quality of medical education has attracted considerable interest during the past few years, especially with regard to the question of how education can be made more relevant to the needs of today's society. Emerging changes in today's society, such as

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rapid advances in technology and changes in demographics, environmental factors, and life style, may necessitate a revision in the current educational system to prepare medical students to deal with problems in the future, preparing them to become active, independent learners and problem solvers rather than more or less passive recipients of information [1]. Basic science teaching and clinical education should be integrated whenever appropriate to promote their application to clinical problem solving [2]. Life-long learning and the demand for continuous development of skills, knowledge, and attitudes needed in working life have resulted in a call for new ways to organize learning [3,4]. Therefore, this review is undertaken with an objective to describe innovative problem-based learning and teaching concepts to help facilitate the better learning of real life situations in the classroom and enhance critical thinking among medical students.

What is problem based learning?

PBL is an instructional, student-centered approach that uses carefully constructed clinical problems as a context for students, to define their learning needs, conduct self-directed inquiry, integrate theory and practice, and apply knowledge and skills to develop a solution to a defined problem. This is a systematic approach or attempt to apply cognitive psychology findings to educational practice. This style of learning is assumed to foster increased retention of knowledge, improve students' general problem-solving skills, enhance the integration of basic science concepts into clinical problems, foster the development of self-directed learning skills, and strengthen students' intrinsic motivation [5,6].

History

In 1913, Sir William Osler, founding professor of Johns Hopkins Hospital, expressed a concern over the education of medical students for reliance on lectures and on students' capability of memorising a growing number of items of knowledge. The amount of information is growing exponentially, no one person can keep up. Osler created the first residency program for specialty training of physicians, and he was the first to bring medical students out of the lecture hall for bedside clinical training. In 1916, John Dewey an educational reformer believed that teachers should teach by appealing to students' natural instincts to investigate and create. The PBL process was pioneered by Barrows and Tamblyn at the medical school program at McMaster University in Hamilton (Canada) in the 1960s, incorporating Dewey's ideas pertaining to learning through active inquiry. Subsequently, many medical schools have introduced PBL for undergraduate instruction to help medical students better diagnose new illnesses [3,6].

Traditional learning versus Problem based learning

The traditional approach of learning has been criticised for a number of reasons (Table 1) [7-10]:

- Many existing curricula fail to meet the needs of current and future doctors
- It creates an artificial divide between the basic and clinical sciences
- Time is wasted in acquiring knowledge that is subsequently forgotten or found to be irrelevant (The acquisition and retention of information that has no apparent relevance can be boring and even demoralizing for students)

- Application of the acquired knowledge can be difficult

The educational objectives of problem-based learning (PBL) address many of these problems in traditional medical curricula. The possible advantages of PBL over traditional approaches include (Table 1):

- Greater relevance to the practice of medicine
- Ability to promote retention and application of knowledge
- Encouragement of self-directed life-long learning

enhance integration of basic science concepts into clinical problems, foster the development of self-directed learning skills, and strengthen students' intrinsic motivation [11,12].

PBL promotes critical thinking. In addition to the formal learning context, everyday challenges emerging from the additional new social contexts provided by problem-based curricula provide fertile environments for the development of metacognition; we are more likely to develop generic, as well as subject-specific skills [13,14]. The students assume increasing responsibility for their learning,

Table 1: Traditional learning versus problem-based learning [7-10]

Traditional learning	Problem-based learning
Set information to learn (told what students need to know)	Teacher assigns a problem
Students need to memorize information	students brainstorm solution (students identify what they need to know)
Test taken on knowledge of information	Students learn and solve the problem and apply to real world circumstances

Educational plan of problem based learning

PBL is an approach to learning and instruction in which students tackle problems in small groups, usually six to eight, under the supervision of a facilitator. The real-life situations are carefully constructed into problems and presented to small groups of students. These phenomena have to be explained by the teachers in terms of their underlying principles, mechanisms, or processes. This also indicates that competence is fostered not primarily by teaching to impart knowledge but by encouraging an inquisitive style of learning. This style of learning is assumed to foster increased retention of knowledge, improve students' general problem-solving skills,

giving them more motivation and greater feelings of accomplishment, thus setting the pattern for them to become successful lifelong learners. Facilitators and evaluators take on the role of resource persons, guiding students in their problem-solving efforts [15,16].

PBL is the process of acquiring new knowledge based on the recognition of a need to learn. PBL as an instructional approach can be characterized as a collection of carefully constructed problems presented to small groups of students. These problems usually consist of a description of a set of real-life phenomena that are in need of some kind of explanation [17]. During the analysis of a problem, dilemmas arise and questions come up that act as learning goals for subsequent,

individual, self-directed learning. The problem, as presented to the students or learners, helps the learners identify pivotal aspects of presentation and use these to develop a plausible set of objectives. These objectives are then organized according to the nature of the mechanisms involved in each, so that, at this stage, there are a relatively small number of generic causes that could have given rise to the presentation. This facilitates the learner's identification of specific information required to identify the cause of the problem through a process known as "strategic inquiry." This information is provided by the facilitator on demand. The data so gathered are incorporated into the formulation, which constitutes the working conceptualization of the problem [16,18].

The role of the facilitator in PBL is to guard the group's dynamic processes and facilitate discussion. The facilitator is not supposed to act as a content expert but does possess a medical overview that is valuable in helping learners see the problem in context. The facilitator is not expected to insert resource material into the discussion unless it is deemed necessary for the group's immediate progress. The aim is to ensure that the learners recognise the steps in the learning process and work through them in a logical and orderly fashion. The facilitator must specifically guard against short circuiting any of the group activities that contribute to the development of independent learning activities [19]. Thus, the facilitator becomes an expert in the learning process. The facilitator assists the group in structuring their thoughts, identifying clinical contingencies, and formulating learning needs. This way, the facilitator subtly influences the thinking process of the group

[19]. Students are randomly allocated into groups, the composition of which changes every year or with each problem. Students meet in groups in the tutorial room with a facilitator. It is ideal to conduct two PBL sessions in a year, allocating one week for each session [20,21].

Advantages of problem based learning

[16,18,22]

- **Emphasis on meaning, not facts:** By replacing lectures with discussion forums, faculty mentoring, and collaborative research, students become actively engaged in meaningful learning.
- **Increased self-direction:** As students pursue solutions to their classroom problems, they tend to assume increased responsibility for their learning.
- **Higher comprehension and better skill development:** Students are able to practice the knowledge and skills in a functional context, thereby better imagining what it will be like using the knowledge and skills on the job.
- **Interpersonal skills and teamwork:** This methodology promotes student interaction and teamwork, thereby enhancing students' interpersonal skills.
- **Self-motivated attitude:** Students think problem based learning is a more interesting, stimulating, and enjoyable learning method, and that it offers a more flexible and nurturing way to learn.
- **The tutor-student relationship:** This aspect that faculty appreciated the most. Faculty also consider PBL a more nurturing and enjoyable curriculum, and believe the increased student contact is beneficial to the cognitive growth of the student.
- **Level of Learning:** Problem based learning medical students score better

than traditional students with respect to learning skills, problem-solving, self-evaluation techniques, data gathering, behavioral science, and their relation to the social-emotional problems of patients.

Disadvantages of problem based learning [23,24]

- Finding enough tutors—one for each six students
- Faculty busy with "traditional" curriculum
- The range of topics that can be discussed is a limiting factor, and quality control is difficult.
- heavy on libraries, computer resources, and support
- Objective evaluation of PBL is difficult
- Inherent conflict with lectures: waste of time
- Lack of genuinely interested facilitators in PBL

CONCLUSION

PBL, by virtue of its nature, brings about student- or learner-centred activity with an emphasis on "strategic inquiry." It facilitates self-directed learning. It also brings an integrated approach to learning and internal motivation. Many educational institutions have a combination of traditional curriculum and PBL, which is found to have more favourable outcomes. Problem based learning is an active and engaging pedagogy that has been successfully used in medical education for many decades. Teachers report a variety of positive learning outcomes after using problem-based learning pedagogy with their students. The PBL pedagogy is easily adaptable to any discipline, and it encourages active engagement among peers as well as with the teacher facilitator. It makes for a

more interesting and lively classroom experience for both the students and the teachers, and has been found to be a useful learning tool in the arsenal of learning and teaching methods.

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Conflict of interest

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