Problem Based Learning (PBL) in Medical Education

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ABSTRACT

Since 1969 PBL (Problem Based Learning) has grown in popularity for teaching students especially Medical students across the globe. It uses problem based scenarios to improve critical thinking and involves four components – Inference, Recognition, Deduction & Interpretation. Contents can vary from basic sciences to clinical scenarios. PBL by definition is a problem solving, rather than information gathering & empowers the students with their own learning process. Curriculum design involves a skilful blend of various educational strategies including PBL designed to help students achieve the curriculum outcomes

KEY WORDS: PBL, education, spices

Introduction:

Since its adoption at McMaster University, Canada, in 1969, problem based learning has grown in popularity. PBL starts with problem scenarios which stimulate student learning. In a student-centred problem-based curriculum, students learn by actively solving problems rather than by passively absorbing information. In so doing, students arrive at general principles and concepts which they can generalise to other situations.[1]

Framework of the PBL course:

Needs in relation to the product of the training programme-

Despite the spread of PBL, there is continuing confusion about whether it can effectively replace the conventional curriculum. By contrast, virtually everyone in higher education is familiar with subject-based learning. The shift to specifying vocational and professional education in terms of the outcomes and competences expected of the graduate has led to a wider use of problem-based teaching and learning in higher education, including the health

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professions. Essentially, students are not treated as empty vessels that need filling. In a student-centred problem-based curriculum, students learn by actively solving problems rather than by passively absorbing information. The PBL uses a problem as the starting point for student learning. New medical schools throughout the world have adopted PBL as the educational and philosophical basis of their curricula and traditional schools have included it within their portfolio of teaching methods or have converted their undergraduate programmes to PBL.

Aims and objectives-

Primary goal of PBL is integration and synthesis of knowledge, skills and attitude into effective critical thinking. Components of critical thinking, in the context of PBL, can be outlined as follows-

- Inference (discriminating among degree of truth or falsity of inferences drawn from a data)

- Recognition of assumptions (recognising assumptions not overtly stated in given statements)

- Deduction (determining whether certain conclusions necessarily follow from the information)

- Interpretation (weighing evidence and deciding whether generalisation, based on the given data, are warranted)

- Evaluation of arguments (distinguishing between 'relevant and strong' and 'irrelevant and weak' arguments).

In all stages of PBL, clear objectives must be defined and understood by all concerned.

Inclusion of contents-

Contents can vary from basic sciences to clinical thematic block. For example, PBL may contain items ranging from sepsis, anaemia, wound healing etc., to abdominal pain, alteration of bowel habit, loss of weight etc.

Contents should be relevant to the stage of learning, and can be set in conjunction with needs of students. Such flexibility has allowed PBL to be 'fun', compared to traditional teaching.

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Organisation of contents-

In traditional medical education, basic sciences provide a foundation for the study of medical disciplines, followed finally, by disordered function of the body.

PBL allows work back from disordered function, explaining it in terms of deviation from the normal. Different steps involved in achieving such a 'reverse' learning is given below-

Process   Outcome

1. Interpret situation
- Definition of terms and clarification of meaning·
- Recognition of key features·
- Situation is described by learners in their language

2. Generate explanation
- Product of existing relevant knowledge
- Presented by group members

3. Define problems
- Statement by learners of the problem that the group decide to take on board

4. Identify a strategy for the enquiry
- Identification of the additional information and understanding needed

5. Decide a strategy for the enquiry
- A plan which details how answers to questions will be sought

The enquiry

6. Pool and test new knowledge
- Individual knowledge contributions integrated· Conceptions and misconceptions resolved

7. Reflect on adequacy of answers
- Learning gain of content
- Recognition of when a return to step 4 is needed

8. Reflect on the group
- Learning gain (of process)

Educational strategies that should be adopted -

Educational strategies relevant to PBL, in light of SPICES model, are described below[3]-

i)   Student-centred / teacher-centred

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PBL is student centred. Students are actively involved in the learning process, such as, active processing of information, activation of prior knowledge, meaningful context, opportunities for elaboration or organisation of knowledge etc.

However, teachers do play important roles in carrying out PBL, as outlined below-

a) Task function- setting task, explaining, suggesting, discussing, pulling ideas together, diagnosing issues preventing progress, ensuring progress made by all members, questioning unclear contributions, summarising outcomes

b) Maintenance function- encouraging contributors, preventing domination, helping to ensure clarity, listening, building up trust between members, commenting on how the group is working, relieving tension and conflict, being available to individual members.

ii) Problem-solving / information-gathering

PBL, by definition, is problem solving, rather than information gathering. Problem acts as a stimulus in further learning. However, once the problems are identified, students may need to gather information (from appropriate sources) in order to make progress.

iii) Integrated (multidisciplinary) / speciality (discipline based).

PBL encourages integrated (or multidisciplinary), rather than speciality (or discipline based) approach. Questions raised by particular problem may need input from various disciplines.

iv) Community-based / hospital-based

PBL can be either community or hospital-based.

v) Elective / standard

PBL encourages an elective, than standard approach. Students define unknown terms and concepts, identify the problems and relevant facts, generate hypothesis of causes and mechanisms, rank hypothesis, test hypothesis by using current as well as new data and knowledge, re-rank hypothesis and manage problems. It is up to students which aspects of the problem they wish to focus on.

vi) Systemic (planned) / apprenticeship (opportunistic)

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PBL follows the systemic approach as it plans the teaching and learning framework. However what experience exactly the students are going to have depends entirely on them, which is a reflection of apprenticeship. Therefore, PBL stands somewhat in between these two approaches.

Teaching method to be used-

Teaching methods used can be variable and may include, newspaper clipping, study guide, audiotape trigger, videotape, textbook, lecture, computer-based materials, clinical sessions, etc. A tutor or facilitator's role is to provide appropriate supportive resource materials. Other students in the group, by virtue of PBL framework, can also facilitate the teaching method.

PBL requires an equality and uniformity in approach. Therefore, the chairs are set in a circle, allowing students to face each other, providing a balanced layout.

Assessment process-

Assessment should be designed to test the individual student's ability to fulfil the curriculum outcomes or objectives

The factors important for assessment can be outlined as follows-

- Reliability, validity and feasibility of the procedure
- Tutor-student relationship
- Tutors having understanding of PBL, knowledge of course and curriculum, personal qualities and expertise in content area, are in a good position in assessing students.

Communication of details of the curriculum-

The details of curriculum should be communicated to learners as well as teachers in advance. This can be done through syllabi, timetable or other methods (e.g., intranet). This course under consideration may be communicated via intranet, allowing easy and distant access.

Fostering of educational environment or climate-

PBL encourages environment of co-operation, participation and probity. In order to maintain the environment, it is important that teachers identify individual student's educational difficulties, ensure that all students are involved in PBL, modulate the challenge and manage group dynamics effectively.

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Students also have the responsibility in maintaining the environment. They should ask- what is going on? What does the finding mean? Do I have all the facts? Do I have the complete picture? Have I faced something similar in past? Have I considered all the possibilities? What knowledge do I already have that can be used? What more do I need to know? Am I right? They should ask themselves and others.

Management of the process-

Local infrastructure dictates the exact framework of management. For example, this course can be conveniently administered by a course committee, under the auspices of the undergraduate medical education committee.

Comments:

Problem-based learning allows reversal of traditional teaching, namely, principles first and examples next. PBL features as one of the educational strategies, as described in SPICES model. In the case of PBL, the extremes are problem-based learning and information-oriented learning. It is helpful for an educator to recognise the location of the current educational strategy in SPICES continuum.[3] The continuum is based not on quantitative differences or the proportion of curriculum time devoted to PBL, but on qualitative differences that occur as one moves along the spectrum between information gathering approach at one end of the SPICES spectrum to problem solving at the other end.

Curriculum design involves a skilful blend of educational strategies designed to help students achieve the curriculum outcomes. PBL may make a valuable contribution to this blend but attention needs to be paid to its appropriate implementation.

References:

1. Harden RM. Medical Education 1986; **20(4)**: 356-365.

2. Davis MH, Harden RM. AMEE Medical Education Guide No 15: Problem-based learning: a practical guide. Medical Teacher 1998; **21(2)**: 130-140.

3. Harden RM, Sowden S, Dunn DR. The SPICES model. *Medical education* 1984; **18(4)**: 284-97.

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