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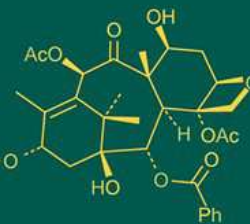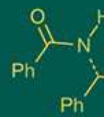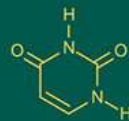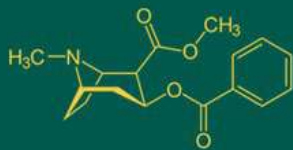
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Problem based learning as tool of self-reflective learning among medical undergraduate student

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Abstract
Problem-based learning (PBL) is one such endeavour in which students are presented with a real-life situation of patients and are required to decode it based on their own understanding and reasoning ability. Teachers serve as facilitators and give resources in this situation. Intense use of such materials, in conjunction with group discussions, peer assistance, and the usage of virtual technology, assists students in becoming self-directed learners.

The ambiguity in PBL problems, along with curiosity, serves as incentive to search, investigate, and learn. When students are given the opportunity to address genuine challenges, they acquire confidence and retain knowledge.

PBL has a wide range of consequences on student learning. They obtain cognitive information while also improving their technical skills, reasoning abilities, understanding group dynamics, absorbing attitudes, and practising communication skills. The medical education unit and management are responsible for faculty development and developing avenues for PBL implementation using tried-and-true methodologies.

Keywords: Problem based learning, competency, learning outcome, reflective learning

Introduction

There is a push in medical education to integrate competencies from all around the world. Countries such as India have identified skills and established a framework for these abilities to be acquired by undergraduate students prior to graduation and serving as the society's first point of contact for physicians. These competences are measured at the conclusion of the course for each student using proper evaluation methods. A medical graduate is defined by the medical profession as someone who is not just knowledgeable in clinical knowledge and abilities, but also a health manager, communicator, collaborator, scholar, and health promoter. He or she should be well-versed in ethical ideals and should act with responsiveness and responsibility. All acts should be guided by humanitarian values. As a result, it is a multifaceted work, and a learner should have many opportunity to obtain these competences throughout undergraduate studies, so that he can deliver in real-world practise [1-3].

The Medical Council of India (MCI) has launched a new educational reform endeavour called as Competency Based Medical Education (CBME) for learners to achieve competencies.

In any field, competency-based learning refers to the execution and design of educational curriculum in such a way that it fulfils the required requirements. Competency of a medical graduate refers to the health care professional's observable capacity to do the entire range of tasks required of him/her in the form of abilities to satisfy the requirements of that nation. Such initiatives must also be internationally relevant [4, 5].

Learner-centered, multidisciplinary, system-based, integrated, and problem-based learning methodologies are being implemented at medical schools. This innovative teaching-learning SPICES (Student Centered, Problem Based, Integrated, Community Based, Electives, Systematic) methodology differs from the previous technique in various ways. PBL is a crucial component of this new paradigm, as well as a contributor to the competency-based learning technique [6].

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PBL, which began in 1962 at McMaster University Medical School in Hamilton, Canada, combines basic sciences within a clinical environment, and students use their knowledge and experiences to solve issues via analysis. It helps kids to build desirable abilities and thinking processes on their own. PBL requires students to take ownership of their own learning and is a significant innovation in adult learning in professional courses. Thus, PBL is a student-centered approach in which students learn about a subject by answering an open-ended challenge presented in the trigger material [7, 8]. Medical students and fellows acquire self-regulated learning skills via reflection on experiences, which can lead to increased competence, humanism, and professionalism. Theory encourages reflection as a technique of advancing knowledge, guiding future learning, deepening comprehension of complicated topics, and exploring emotionally difficult circumstances. However, the influence of reflection on medical trainees and its most effective use in Graduate Medical Education (GME) are unknown [9].

History of Problem based learning
Educators think that when individuals encounter a genuine problem and solve it on their own, they gain knowledge and abilities. Howard Barrow, a medical educator from Ontario, Canada, attempted to design procedures that would allow physicians to solve health issues professionally while adhering to humanitarian values.

While medical schools throughout the world concentrated on imparting knowledge, Barrow considered students' ability to use that knowledge in evaluating patients' health issues and giving appropriate care to patients, precisely as they were intended to do in real life practise. Barrow developed "problem-based learning" after much thought, which states that it "allows [medical] students to integrate, use, and reuse newly learned information in the context of patients' problems; the symptoms, signs, laboratory data, course of illness, and so on provide cues for retrieval in the clinical context [10]."

Barrow devised a set of puzzles for pupils to solve and therefore gain experience. He did not offer pupils with all of the material they needed, but instead required them to hunt for a scenario, construct relevant questions, and create their own plan to explain the problem. This helped students develop their "clinical reasoning process" as well as their grasp of the resources at their disposal [11].

PBL was introduced into the teaching schedule at McMaster University in Ontario, Canada, by Barrow in 1962. By 1970, medical schools in the Netherlands, Australia, and Mexico had all embraced it. Other fields quickly embraced PBL, including business, dentistry, law, school teaching, and engineering courses [10, 11].

Significant influence of Problem based learning
Traditional medical science education includes frequent exposures to patients with various conditions on wards and in tutorial sessions. The instructor delivers information with skill demonstrations in these exercises, and it is expected that students would construct concepts and gain skills via observation and practise. Some argue that there is no real-world situation and that pupils are not tackling real-world problems. Students strengthen thinking skills and understand topics while working on PBL. Several studies have shown that PBL helps students collect material while also improving thinking methods. The relevance of PBL is that students use learning resources appropriately to increase their knowledge and comprehension [12].

As a result, it improves pupils' cognition and alters their behaviour. In analysing Millar's pyramid of clinical competence in the context of PBL, the teaching learning approach impacts all levels of the pyramid from 'knows' to 'does' and assists a student in ascending from novice to expert. Furthermore, PBL allows students to participate in group debates, learn about group dynamics, and enhance their communication skills. In addition to cognitive skill development, students do research through inquiry, use their learning in addressing future challenges, and can publish their results in a research report. Most crucially, the relevance of PBL is associated with intrinsic motivation and is responsible for lifelong learning engagement [13].

Need to Implement PBL in Medical Education
Medical education is a lifelong process of learning. It does not end with the completion of a postgraduate study, but continues throughout life, and hence a professional physician must be a lifetime learner. Various medical groups throughout the world, such as the MCI, have expressed worry about the current medical education's restricted applications. Apart from professional knowledge, society expects outstanding communication skills from doctors, as well as acts that are infused with positive attitudes and ethical ideals. However, there is no such thing as a distinct class for it. There is no integration of clinical classes with fundamental scientific disciplines when clinical classes are established. It is envisaged that students will form conceptual linkages concerning the human illness process as a result of what they have learned. Such studies are referred to as 'surface' learning since they are not retained in the memory [14, 15].

Knowledge gain is just an increase in information load. It fails to promote critical thinking and reasoning abilities, both of which are necessary for a doctor. Students memorise subjects in order to pass the examination-based system. The students' excitement for this subject has faded, and information overload has become an unbearable burden.

The current state of medical practise suggests that the health-care system should be more patient-centered. It should suit societal requirements. The society's expectations are greater. People will not accept any delay in diagnosis or treatment. All of the physician's activities must be transparent, and all conversations must be professional. Some competencies that do not have a place in the current medical education curriculum include attitude development, professionalism, and communication skills [16].

Student's reasonable use of skills in determining course material, usage of technology, shouldering responsibility for personal learning, meaningful application of knowledge acquired, and suitable teamwork are critical [17].

Features and Characteristics of PBL
The core curriculum in undergraduate medical education consists of the fundamental information, attitudes, and abilities necessary for a medical graduate of the twenty-first century to become the society's first point of contact. This core must be centred on humans and human society, as well as public health.

Clinical problem solving and the development of critical thinking abilities are the fundamental need for multi-

dimensional methods. Students should establish attitudes that promote continual professional development from the start. Learning gets easy for pupils if they realise the importance of the subject.

In PBL, learners take on the responsibility of producing the learning process both individually and in groups. It stimulates group conversations. Students frame their bases and search their learning resources using both solo and peer assessments. It is self-reflective, and students learn to monitor their own progress [14].

The exercise begins with a real-world scenario that includes a description of a series of occurrences that must be explained in terms of the underlying process or mechanism. The problem is presented in the manner in which it would appear in reality. The students' objective is to explain the phenomena through self-study and group discussion.

The quality of the problem supplied is the most important element. The students work on the problem, putting their knowledge and expertise to use. The student analyses the problem and proposes a solution. PBL curriculum provides for the transfer of concepts to solve problems, increases intrinsic interest in the subject matter, and improves self-directed learning abilities, all of which may be sustained [18]. The knowledge and abilities gained via problem-solving activities are incorporated into the student's current knowledge and skills. Learners can make connections between what they are learning and what will happen in the real world.

Students must work with the problem as far as feasible in order to determine what they need to learn. The learners do self-directed research to identify and apply a number of information resources (books, journals, reports, internet material, and a variety of persons with suitable areas of expertise) to arrive at an appropriate solution to the issue offered. Learning is therefore tailored to the individual's requirements and learning methods. Students return to the topic after accumulating knowledge, apply what they have learned, and give plausible answers. After completing the exercise, students do self and peer assessments [19].

Teacher Role in PBL
The teacher's responsibility in PBL is to provide instructional resources and assistance that encourage learning. The teacher's primary function as a facilitator or educational coach is to guide the students.

The teacher's involvement diminishes as learners gain proficiency in the PBL learning process. The teacher oversees the assessment reports submitted by students.

Teachers also recognise students' achievements and oversee students' problem-solving activities. In this case, the teacher does not present information and does not assess students' recall abilities through fact memorization [20].

Strategies and Steps in PBL Implementation
To implement the PBL, there are 6 steps in planning a successful PBL programme and implement. The strategies are represented as below;
a) Identify the outcome: The facilitator creates formative and summative tests to define the information gained. Determine whether the project contains a problem-solving component.
b) Project or problem designing: Consider a real-world situation connected to the topic courses that must be learned. Create an issue linked to the subject that will stimulate students' thinking while also leading them to seek.
c) PBL scenario introduction to students: Enable the group to read the scenario and then allow pupils to do it their own way within a time restriction.
d) Student activity: The activity starts with small-group brainstorming sessions in which students describe the problem and establish what they know about it (background knowledge), what they need to learn more about (topics to research), and where they need to explore for evidence. They may require the aid of the teacher and seniors. After gathering the essential facts, students construct an initial answer.
e) Summarise the performance: After conducting research, developing hypotheses, and determining a solution to the problem, the students present their findings to the facilitator. Students' resources expand the background information that defines their grasp of the topic presented, and they then present their findings, including one or more possible solutions, to the class as research posters.
f) Assessment: The finished result is evaluated by the instructor using the summative evaluation that was generated at the start. All candidates must participate in the conversation. Students should provide comments on their work using acceptable reasoning so that information may be used further and the process can be continued.

This sort of process-oriented, self-directed, and collaborative teaching technique can help students succeed in their futurist endeavors.

Challenges while implementing the PBL and proposed solution
Various tactics have been implemented for successful operation and execution of the improvements envisioned for the seamless adoption of CBME. Setting up such settings from scratch and putting them forward in the field is a huge task for the college Medical Education Unit (MEU) and administrative authorities.[21]

The settings are divided into two categories: 1) learner-centric and 2) non-learner-centric. 2) knowledge-centered, 3) assessment-focused, and 4) community-focused [21].

PBL methodologies necessitate that students bear the burden of their own learning. Students' problems should have a strong community orientation. Modifications to the educational programme should be made going forward [22].

The primary teaching approaches include independent study, peer group learning, and small tutorial group discussions. Didactic lectures must be kept to a minimum and, when present, must be engaging and focused. As a result, garnering student confidence, as well as teacher participation, are critical success factors for PBL implementation. Inability will result from a lack of clear implementation standards as well as faculty failure to identify learning outcomes.

To acquire student trust and help students with group dynamics, the Institute must develop a professional environment with experienced faculty who can produce suitable learning outcomes.

Relevance of PBL with Medical Learning

Malcolm Knowles coined the term "andragogy" to describe the adult learning process. It is the arts and sciences that assist grownups in learning. Adults learn with motivation by analysing their own needs, and it is up to them to develop their own learning objectives and prerequisites. Adults require assistance in order to focus on learning goals and carry out strategies. Institutes will assist or instructors will assist in establishing learning outcomes, locating resources, and engaging in collaborative planning. PBL is a technique of learning in professional courses that fits into the aims of adult learning theories. It aids in the maximum use of resources, knowledge, group discussions, and learners will have greater control over their own learning. They will develop their own ways to achieve their self-identified learning objectives in order to become competent [23].

Conclusion

Professional competency evaluation is required for CBME. PBL is one such teaching learning strategy that allows for the development of competency. It is an activity that helps the development of specialised information, necessary skills, and professional attitudes by a medical graduate in order to become competent, as well as the acknowledgment of necessary abilities at places of professional employment. In each department, a logbook may be constructed for monitoring the learning process and gathering input from stakeholders to determine whether learning objectives are met. PBL in teaching approaches will foster critical thinking skills in medical students while also promoting self-directed learning. Instead of factual recollection, such ways to brain storming will promote conceptual comprehension.

Conflict of Interest

All the authors in study declare no conflict of interest and willing to publish the complete study to the journal.

Reference

1. Davis DA, Taylor-Vaisey A. Translating guidelines into practice: a systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. Cmaj. 1997;157(4):408-16.
2. Dasgupta A. Problem based learning: its application in Medical Education. J West Bengal Univ Heal Sci. 2020;1(2):11-8.
3. Jones DS, Greene JA, Duffin J, Harley Warner J. Making the case for history in medical education. J Hist Med Allied Sci. 2015;70(4):623-52.
4. Carraccio C, Wolfsthal SD, Englander R, Ferentz K, Martin C. Shifting paradigms: from Flexner to competencies. Acad Med. 2002;77(5):361-7.
5. Mortaz Hejri S, Jalili M, Masoomi R, Shirazi M, Nedjat S, Norcini J. The utility of mini-Clinical Evaluation Exercise in undergraduate and postgraduate medical education: A BEME review: BEME Guide No. 59. Med Teach. 2020;42(2):125-42.
6. Harden R, Sowden S, Dunn W. Educational strategies in curriculum development: the SPICES model. Med Educ. 1984;18(4):284-97.
7. W0od DF. ABC of learning and teaching in medicine problem—based learning J BMJ. 2003;326:328-30.
8. Parsell GJ, Bligh J. The changing context of undergraduate medical education. Postgrad Med J. 1995;71(837):397-403.
9. Winkel AF, Yingling S, Jones A-A, Nicholson J. Reflection as a Learning Tool in Graduate Medical Education: A Systematic Review. J Grad Med Educ. 2017;9(4):430-9.
10. Barrows HS, Tamblyn RM. Problem-based learning: An approach to medical education. Vol. 1. Springer Publishing Company, 1980.
11. Neufeld VR, Barrows HS. The McMaster Philosophy: an approach to medical education. Acad Med. 1974;49(11):1040-50.
12. Newman MJ. Problem based learning: an introduction and overview of the key features of the approach. J Vet Med Educ. 2005;32(1):12-20.
13. Shumway JM, Harden RM. AMEE Guide No. 25: The assessment of learning outcomes for the competent and reflective physician. Med Teach. 2003;25(6):569-84.
14. Walton H. The balance between education and training. Wiley Online Library, 1988.
15. Kate MS, Kulkarni UJ, Supe A, Deshmukh YA. Introducing integrated teaching in undergraduate medical curriculum. Int J Pharm Sci Res. 2010;1(1):18-22.
16. Dasgupta A. Competency Based Medical Education. In Indian Perspective, an Overview. ASSAM J Intern Med, 2018, 28.
17. Wetzel MS. Problem based learning: an update on problem based learning at Harvard Medical School, 1994.
18. Norman GT, Schmidt HG. The psychological basis of problem-based learning: A review of the evidence. Acad Med. 1992;67(9):557-65.
19. Dochy F, Segers M, Van den Bossche P, Gijbels D. Effects of problem-based learning: A meta-analysis. Learn Instr. 2003;13(5):533-68.
20. Schmidt HG. Foundations of problem-based learning: some explanatory notes. Med Educ. 1993;27(5):422-32.
21. Steward TJ. Learning environments in medical educations. Med Teach. 2006;28(4):387-9.
22. Savery JR, Duffy TM. Problem based learning: An instructional model and its constructivist framework. Educ Technol. 1995;35(5):31-8.
23. Cantillon P, Wood DF, Yardley S. ABC of learning and teaching in medicine. John Wiley & Sons, 2017.