

MEDICAL EDUCATION

Students' Perceptions to Introduction of Problem-based Learning Modules in Anatomy

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ABSTRACT

Introduction: It is necessary for core knowledge of anatomy to be assimilated by all doctors in order to practice, but if it can improve their understanding of what they do and why they do it, this surely has to be of benefit for both the safety of the patient and satisfaction of the doctor as a professional. This intervention aimed to study whether problem-based learning (PBL) as an educational strategy can help in improving the quality of gross anatomy teaching and the attitude of students toward the learning method in India.

Materials and methods: The study sample included 100 students who were assigned to 10 groups (10 students in each group). Each PBL tutorial was conducted over three sessions. Pre- and post-tutorial tests were conducted. Data collection was done by a questionnaire survey to examine the students' learning attitudes and perceptions toward this platform as a possible learning tool. The obtained data were compared, and the main themes were determined.

Results: We found out the satisfaction of students with this learning method and the students' interest and ability for improvement after this teaching method. Also, the problems and obstacles the students faced in this learning mode were highlighted.

Conclusion: The study clearly pointed out that PBL benefits a lot of students in the study of gross anatomy despite the existing problems. In future, we should implement PBL combined with the characteristics of traditional anatomy teaching.

Keywords: Facilitator, Problem-based learning, Self-directing learning, Student-centered teaching.

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INTRODUCTION

Physicians are required to have cognitive abilities that include problem-solving skills, decision-making skills,

and sound clinical judgment. They also have a societal obligation to maintain their knowledge and skills by engaging in lifelong learning.¹ Many physicians' organizations have identified learning as a lifelong activity and have accepted the need to become a self-directed learner as an essential competency, recommending that these competencies should be improved and evaluated throughout the education of physicians.¹⁻³ Correspondingly, medical educators have sought to ensure that students are well equipped with the necessary self-regulated learning skills to cope with the continued exponential growth in medical knowledge.⁴

In recent years, one of the major innovations in medical education has been problem-based learning (PBL). Problem-based learning, as used in medical education, has specific purpose, features, and outcomes and has been used as a driving force to generate curriculum reform through concentration on a single curriculum element.⁵ Problem-based learning was first employed in the 1960s in the Medical Education Department at McMaster University' Faculty of Health Sciences, Canada, and soon after, other medical schools in Netherlands, United States, and Australia followed.⁶ This type of teaching, based on research by Barrows in the 1960s, seeks to integrate basic sciences and clinical teaching, leading to the acquisition of an integrated knowledge base, i.e., readily recalled and applied to the analysis and solution of problems.⁷

Problem-based learning aims to develop effective self-directedness⁸ and helps students to develop effective problem-solving skills and to become active participants in their own learning by enabling them to construct knowledge.^{9,10} In PBL, students learn content and strategies and develop self-directed learning skills by collaboratively solving problems, reflecting on their experiences, and engaging in self-directed inquiry.¹¹⁻¹⁴

Problem-based learning is an innovative and challenging approach to medical education; innovative because it is a new way of using learning material to help students learn, and challenging because it requires the teacher to use facilitating and supporting skills rather than didactic, directive ones.^{15,16} It is an approach much favored by curriculum planners in new and more progressive academic institutes.¹⁷ It is a worldwide common opinion that anatomy must be taught and learnt in such a way

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that it becomes clinically meaningful and is related to the competences required by new medical graduates so that the students understand its relevance to their future practice.¹⁸

So, the present study was undertaken to introduce PBL modules for clinically relevant topics in the Department of Anatomy at a tertiary care hospital and medical college in Amritsar; the study was conducted with the sole purpose of introducing students and teachers to the new teaching–learning modality and evaluate the perceptions of students regarding its significance and future modification of the PBL modules. Till date, apart from didactic lectures, small groups of teaching strategies/modalities have been used in the department, though not in a planned and focused manner. So, it was high time to introduce, in a phased manner, a time-tested modality (PBL) and evaluate it for future planning and implementation.

MATERIALS AND METHODS

The study was conducted for a batch of 100 students from session 2011 to 2012. The study was duly approved by the Institutional Research and Ethics Committee. The faculty and students were oriented and introduced to the concept of PBL and group discussion through interactive power point presentations. All participants were informed of the purpose and design of the study. Each student was assured that the data obtained and their identities would be confidential and anonymous. All students willingly participated in the study, and no control group was formed due to ethical issues. Informed written consent was obtained from all the students. Modules on four paper-based clinical scenarios were given as problems, which were prepared for head and neck and abdomen of gross anatomy by trained faculty of the anatomy department in consultation with the surgical department. Each PBL module comprised three sessions. The present study not only addressed the students' perceptions but also tested the level of acquired knowledge.

Outline of the PBL Module

- Pretest taken is given as a multiple choice question (MCQ) test.
- The paper-based PBL scenario/case is given to the allocated groups of 10 to 12 students (Session 1).
- Students familiarized themselves with the case and formulated learning goals that were arrived at after brainstorming. Possible explanations for the main issues that they had identified for the case were generated.
- Learning objectives were defined by each group at the end of Session 1.

- Students were expected to realize these learning goals by means of self-study using a variety of resources available to them, including library books and journals, the Internet, etc. (Students were given 3 to 4 days duration for clarifying the concepts using various resources).
- Students reported back on their findings, shared and pooled their knowledge, and evaluated their own learning in Session 2.
- Facilitators made sure that the discussion was within the precincts of learning objectives and students clarified their doubts with each other and with their teacher.
- The students assembled for the final presentation (power point) in a large group for Session 3 and facilitators clarified doubts.
- Posttest is taken MCQ.
- Student feedback questionnaire survey was done.

Students followed the principles of group dynamics by appointing a leader, scribe, timekeeper, and reporter to conduct fruitful discussions in each session. Thus, they were also accustomed to the principles of group dynamics.

RESULTS AND DISCUSSION

Descriptive analysis of students' responses collected through prevalidated feedback questionnaire was performed. The questionnaire contained 12 structured questions and three open-ended questions, which were intended to elicit comments regarding advantages and fallouts of PBL modules and suggestions for improvement. When the module was conducted, 94 students participated (six students were not able to complete the module due to absenteeism), and 84 students responded to feedback questionnaire (90% response rate). For the purposes of reporting and discussing the results, the percentage of student's responses has been rounded off to the nearest whole number.

As evident from Table 1, the percentage of students agreeing to most of the questions posed to them was in the range of 46 to 91%. Majority of students perceived that PBL helped in improved grasping of subject (89%), brought in more interactions among students (85%), can be used with lectures in tandem (86%), and will be helpful in clinical years (90%). The process of underpinning PBL is based on a cognitive perspective of "how we learn." It emphasizes the key activities of activating prior knowledge, learning in context, and elaboration.¹⁹ A total of 59% students felt that it will help them perform better in university exams. It was a perception based on students' acquisition of knowledge though not proven. And, 72% respondents perceived that PBL helps to

Table 1: Students responses to 5-point Likert scale questionnaire. Total number of respondents (n = 84)

Sl. no.	Questions	Strongly disagree (%)	Agree (%)	Uncertain (%)	Disagree (%)	Strongly agree (%)
1	PBL tutorial helped in better grasp of subject	80	9	8	3	
2	Group discussion brought in more interaction among subjects	79	6	6	8	1
3	PBL can be used along with lectures to teach anatomy	83	3	6	8	
4	PBL tutorials will help in better clinical knowledge later	80	10	10	–	
5	It helps in better performance in university exams	50	9	29	12	
6	It can be used to teach other topics of anatomy	74	4	10	12	
7	It can be used to teach other subjects as well	73	8	7	12	
8	Small group discussion improves problem-solving ability	62	10	18	8	2
9	Facilitators were helpful during group discussion	80	3	10	7	
10	PBL was conducted in a systematic manner	41	9	31	19	
11	PBL module gives an opportunity to clarify doubts and express one's thoughts	40	6	32	22	
12	Presentations from each group helped me learn better	62	6	18	14	

improve problem-solving skills. It is not necessary to solve the problem, but the experience of gathering and learning the information to support an understanding of the problem is where learning occurs.²⁰

A moderate response was garnered for systematic conduct of tutorial (50%). One of the main reasons is lack of experience on the part of faculty and students to understand and conduct the group activity. A total of 83% of students felt that facilitators were helpful. Facilitation in PBL is particularly challenging since the tutor should provide as little guidance as possible while at the same time not allow the students to get lost. Role of tutor moves from didactic dispensing of facts toward being a somewhat privileged and outside group member who steers the group to enhance group dynamics. Gilkison²¹ indicates the importance of tutors' roles of "raising students' awareness" and "facilitating the group processes" in a PBL setting. The facilitator should be able to shadow the discussion so as to keep a hawk's eye on the proceedings and also to not miss the points raised, their relevance in context, outcomes reached, and further readings planned.

Open-ended questions regarding what went well, what was still desired, and any suggestions were asked to the students to elicit elaborate student perception. Themes extracted from the qualitative analysis were broadly categorized (Table 2). A total of 54% students perceived that PBL helps to develop interactions among students and clarifying concepts, which were otherwise overlooked. The Questions that cropped up during the discussion help to make session more meaningful and learning-oriented.* A total of 36% students opined that it helps to improve subject retention. This is in conformation with other studies.²²⁻²⁴ A total of 31% students felt that an exposure to problem solving will give them an edge in clinical settings in subsequent years. We get an opportunity to train our minds for a similar environment during clinical terms.

Table 2: Theme-based analysis of open-ended questions

Sl. no.	Theme generated	% of student response
1	Concept clarification	54
2	Collaborative learning	25
3	Interactions among students	54
4	Wider coverage of topic beyond the books	31
5	Better retention of topic	36
6	Confidence building occurs	19
7	Generates interest in the subject	16
8	Useful in clinical years	31
9	Communication skills improved	13
10	Strategic tackling skills developed	13
11	Team work developed	6
12	Final presentation is useful	6
13	Less time for discussion	36
14	Nonavailability of Internet and computers	80
15	Lack of group dynamics	60

To say that we encountered problems is wrong. Actually we encountered challenges. Problems are troublesome, but Challenges make us learn better. Because of the wide expanse of medical knowledge, the confidence of students plummets within the first few months of their entry into medical profession. This reduces their motivation and urge to excel, which is so evident in the beginning. A total of 19% students perceived the spike in their confidence levels after participating in PBL modules. One is able to know one's potential and explore the plethora of potential within. Some studies have demonstrated that PBL enhances students' intrinsic interest in the subject matter, strengthens students' self-directed learning skills,²² and is more nurturing and enjoyable.²⁵ We can express our thoughts without HESITATION.

The major roadblock encountered, as fished out from student feedback, was the lack of Wifi facility in the campus (80%). The students could access the library

*Students' verbatim responses are in italics.

resources and journal, but the lack of Internet hindered the requisite progress intended. Other studies have also emphasized that PBL supplemented with e-learning will enhance the students' ability to learn collaboratively²⁶ and noted increased interactivity of PBL sessions with "blended" curricula.²⁷ Several steps have been initiated to expedite the Internet services in the institute. It will improve the participation of students in the subsequent years. A total of 36% students felt there was lack of adequate time for discussion to clarify doubts and browse through resources. This obstacle can be overpowered with efficient planning to use uncluttered time zones when not so difficult areas are dealt with in all the three subjects of the first year.

Lack of group dynamics (60%) was envisioned as the students are inexperienced in small group discussions. They are more comfortable and aligned to passive, one-way communication of didactic format. A sustained effort will assist to track out dynamics among students.

CONCLUSION

Problem-based learning will assist not only to gain the desired knowledge incumbent of medical graduate but also inculcate skills, such as communication, critical reasoning, logical and analytical approach to problems, reasoned decision-making, and self-evaluation. Developing group dynamics will help in interdepartmental and interdisciplinary execution of projects. The suggestions given by students and the faculty discussions in the department will be very valuable for conducting PBL tutorials henceforth.

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