

Perception of Problem Based Learning by Undergraduate Dental Students in Basic Medical Science

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ABSTRACT

Background: Problem based learning is self-directed form of learning. Problem of Diabetes Mellitus was chosen. The objective was to evaluate perception of students towards Problem based learning and test their understanding.

Methods: A descriptive study was conducted from November 2019 till October 2020. An online Problem based learning session of a week was conducted to second-year Bachelors of Dental Surgery students using online applications. Tutors facilitated students in a group of five to six each. Pre-post testing of evaluation questions was done. At end of session, feedback of students on Problem based learning and tutor of Problem based learning were received with 'Dolmans and Schmidt' and 'Dolmans and Ginns' questionnaire.

Results: There was increase in correct response in nine out of 12 evaluation questions. Most students agreed to influence of discussion, content tested, course objectives, lectures, tutor and reference literature. The students agreed that tutors facilitated active, self-directed, contextual and collaborative learning.

Conclusions: The influence of discussion among participants, content tested, course objectives, reference literature during the Problem based learning session were agreed upon by majority of the students. The tutors' role was accepted by participants in terms of stimulation to self-directed, active, collaborative and contextual learning.

Keywords: Diabetes mellitus; problem based learning; tutor

INTRODUCTION

Problem based learning is a self-directed active form of learning.^{1,2} Barrows and Tamblyn³ defined PBL as "the learning which results from the process of working toward the understanding of, or resolution of a problem". The problem is a basis of discussion.

This method of learning has not been introduced yet in syllabus of our institute though university has mandated one to two weeks of PBL.⁴ Students are more focused in scoring marks rather than deep learning which can be overcome by PBL. We chose Diabetes Mellitus as our problem as it has many oral manifestations and need a lot of oral care.^{5,6} Students understanding of pathophysiology, oral manifestations and treatment at pre-clinical course will benefit them in their clinical practice.

The objective of the study was to assess the perception of students about PBL and their level of understanding after attending PBL session.

METHODS

A descriptive study was conducted amongst second year BDS students of Gandaki Medical College (GMC) enrolled in academic year 2020/21. The study duration was of a year from November 2019 till October 2020. All the students consenting to participate were included. There were 25 students in second year BDS and 22 of them participated in study. The ethical approval was obtained from the Institutional Review Committee of GMC with registration number 024/2076/2077 dated 29th May, 2020.

The students have two years of basic science curriculum in their first two years. Endocrine system is a part of their second-year curriculum. We conducted PBL during this system. We had an initial plan of face-to-face PBL but it was not possible due to COVID 19 outbreak. So, we changed mode of delivery to online using various software namely Viber, Messenger, YouTube, Google form and Zoom. Anatomy, Physiology, Biochemistry, Internal Medicine, Pharmacology, Oral pathology and

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Periodontology experts were involved in designing case, triggers and evaluation questions of PBL. Each expert also formulated their specific learning objectives for modules. The tutor guide was compiled with inclusion of five triggers, student-tutor interaction in each trigger, learning needs, learning objectives, case summary and one mini problem. Suggestions were also obtained from PBL experts in and out of institute.

Evaluation questions comprised of 12 true/false questions, three questions each from four subjects: Anatomy, Biochemistry, Physiology and Pharmacology. Expert validation of questions was done with experts of each subject. The reliability of the tool was tested using Cronbach’s alpha. Time period for PBL was six days (42 hours). The time schedule was calculated in a period of six days. The teaching learning hours of students is seven hours per day in our institute so for a week of six days, the total number of hours calculated was 42. These hours included tutorial sessions as well as self-study sessions. Approval was obtained from authorities before starting session.

Self-study instructions were designed to motivate and guide students towards teaching learning objectives. Self-study instructions included process of accessing materials like videos, articles, which were provided in ‘Viber’ and ‘Messenger’ software. They were also suggested to put their queries in ‘Viber’ (all students group) and ‘Messenger’ software (individual group) to assist in the self-study by guidance of each tutor. A total of five triggers were designed and distributed over two tutorial sessions of two hours each. Tutorial sessions were conducted in ‘Zoom’ application. It was conducted online by scheduling a meeting, sending a meeting link one day ahead in ‘Viber’ and ‘Messenger’ and allowing students to join the meeting. The meeting duration was of 40 minutes. After 40 minutes, a break of five minutes

was given and meeting was resumed. In this way, it was conducted for two hours in each tutorial session. Students were divided into four work groups. Work group instructions were designed and given to each group and team followed group dynamics. Each work group was guided by a tutor.

We provided study materials from books, journal articles and videos as reference learning materials during session through Viber and Messenger. Post-test was conducted at end of session along with feedback questionnaires in Google form. The pre-test was conducted before start of session. The data collection tools used were Dolmans and Schmidt questionnaire⁷ and Dolmans and Ginns questionnaire.⁸ Focussed group discussion of tutors were conducted before the PBL session to plan and organise the session. The discussion was also done after the session to share the experience of the week in different themes like benefits to tutor, tutor perspective on learning of students and any modifications/suggestions for future. Data were entered in Microsoft Excel. Percentages and means were calculated in relevant places using Statistical Package for Social Sciences 21.0 version.

RESULTS

The Cronbach’s alpha of perception questionnaires on our study was 0.8. Among a total of 25 students, 22 of them participated with a response rate of 88%. Pre-post comparison of evaluation showed that knowledge increased following PBL sessions in all items except two as depicted in Table 1. In these two, there was even decrease in number of correct response.

Students’ feedback on PBL module (Table 2) showed that most of them agreed and strongly agreed to six themes.

The tutors were evaluated by students through a

Table 1. Pre-test and post-test comparison of evaluation questions.

Evaluation questions	Pre-test correct response n (%)	Post-test correct response n (%)
Insulin is secreted by beta cell of islets of Langerhans.*	19 (86.4)	22 (100)
Islets of Langerhans of pancreas contain exocrine cells.†	17 (77.3)	18 (82)
Head of pancreas is located in right upper quadrant of abdomen.*	18 (82)	18 (82)
Glucose is transported through sodium glucose linked transporters (SGLT) in intestinal mucosa.*	19 (86.4)	20 (91)
Somatostatin exerts facilitatory effect in insulin secretion.†	16 (72.8)	15 (68)
Type 2 diabetes is due to insulin deficiency caused by autoimmune destruction of the B cells in the pancreatic islets.†	8 (36.4)	11 (50)
Fasting Blood Sugar, Postprandial blood sugar, HbA1C tests are diagnostic criteria of T2DM.*	14 (63.7)	20 (91)

Microalbuminuria in urine dipstick test indicates nephropathy.*	17 (77.3)	18 (82)
Insulin inhibits gluconeogenesis and glycogenolysis, stimulates glycolysis and glycogenesis.*	19 (86.4)	21 (95.5)
Insulin glargine is a long-acting insulin.*	20 (91)	22 (100)
Mechanism of action of metformin is enhancement of secretion of insulin acting as a secretagogue.†	13 (59)	9 (41)
Sulfonylureas cause hypoglycemia and weight gain as an adverse effect. *	21 (95.5)	22 (100)

* Correct statement, † Incorrect statement

Table 2. Responses on students' feedback on PBL session on a five point Likert scale.

Theme	Items	Agree n (%)	Neutral n (%)	Disagree n (%)
Theme 1 Influence of the discussion in the tutored group	1. The discussion in the tutorial group determines to a large extent what I will study	21 (95.5)	1 (4.5)	-
	2. The tutorial group discussion is an important stimulus for my learning activities during self-study	21 (95.5)	1(4.5)	-
	3. The learning issues generated are the most important starting point for my learning activities during self-study	20 (91)	2 (9)	-
	4. I study to a large extent independently from the learning issues generated	16 (72.8)	4 (18)	2 (9)
Theme 2 Influence of content tested	5. I take a look at the questions included in the tests to get an idea of how deeply I should study particular subject-matter.	20 (91)	2 (9)	-
	6. The questions that are included in the tests to a large extent determine what I will study.	18 (82)	3 (13.7)	1 (4.5)
	7. The closer the date the test will be administered to us, the more time I spend on test	18 (82)	2 (9)	2 (9)
	8. The closer the date the test will be administered to us, the less time I spend on studying the learning issues generated in the tutorial group.	6 (27.3)	4 (18.2)	12 (54.5)
	9. I do not spend any time on studying particular issues, if I am convinced that these issues will not be tested.	6 (27.3)	6 (27.3)	10 (45.5)
Theme 3 Influence of the course objectives	10. The learning issues generated in the tutorial group are tuned to the subject matter expected to be tested.	14 (63.7)	8 (36.4)	-
	11. At the start of a course, I consult the course objectives stated in the course book.	17 (77.3)	3 (13.7)	2 (9)
	12. At the end of the course, I consult the course objectives to check whether I covered all the subject matter I was expected to cover.	17 (77.3)	4 (18)	1 (4.5)
Theme 4 Influence of the tutor	13. During the course, the course objectives influence what kind of learning activities I will conduct.	22 (100)	-	-
	16. Tutors stimulate my learning activities	20 (91)	2 (9)	-
	17. Tutors stimulate students to make use of different sources of information.	20 (91)	2 (9)	-
Theme 5 Influence of reference literature	18. Tutors have an important influence on the selection of learning issues.	22 (100)	-	-
	19. I usually confine myself to the reference literature cited in the course book when searching for relevant literature.	11 (50)	9 (41)	2 (9)
	20. I hardly review literature beyond the sources that are included in the course book.	6 (27.3)	8 (36.4)	8 (36.4)

questionnaire under five themes. The data showed that there was overall agreement on each theme of active learning, self-directed learning, contextual learning, collaborative learning and intra-personal behaviours as a tutor as elaborated in table 4.

The grade given by students for tutor was 8.5 (SD: 1.27) in average. The score provided by students to tutors was averaged as 8.5. The suggestion given to tutor was tutor was ill fitted for online system.

Table 3. Students feedback on tutor performance on a 5-point Likert scale.

A. Constructive/active learning (The tutor stimulated us)	Agree n (%)	N n (%)	D n (%)
1.To summarize what we had learnt in our own words	20 (91)	2 (9)	-
2.To search for links between issues discussed in the tutorial group	20 (91)	2 (9)	-
3.To understand underlying mechanisms/theories	22 (100)	-	-
B. Self-directed learning (The tutor stimulated us)			
4.To generate clear learning issues by ourselves	19 (86.4)	3 (13.7)	-
5. To search for various resources by ourselves	20 (91)	2 (9)	-
C. Contextual learning (The tutor stimulated us)			
6.To apply knowledge to the discussed problem	21 (95.5)	1(4.5)	-
7. To apply knowledge to other situations/problems	17 (77.3)	4 (18)	1 (4.5)
D. Collaborative learning (The tutor stimulated us)			
8.To give constructive feedback about our group work	19 (86.4)	3 (13.7)	-
9. To evaluate group co-operation regularly	15 (68)	7 (31.9)	-
E. Intra-personal behaviour as tutor			
10. The tutor had a clear picture about his strengths/weaknesses as a tutor	13 (59)	8 (36.4)	1 (4.5)
11. The tutor was clearly motivated to fulfil its role as a tutor	21 (95.5)	1 (4.5)	-
Absence/replacement			
13. How often was your own tutor absent?	1 (4.5)	8 (36.4)	13 (59)
14. How often did your tutor take care of replacement when being absent?	9 (41)	10 (45.5)	3 (13.7)

DISCUSSION

Overall, PBL approach exposed students to a new method of learning and most of the students were satisfied to explore this method. Our study findings corroborated with that of similar other studies.⁹⁻¹⁷

In contrast to perception of students in our study, Emerald¹⁸ in Malaysia presented that students perceived PBL as time consuming method. They also felt that all participants were not equally participating in discussion.

In evaluation questions, although there was increase in correct responses in post-test, there was not increment in all the questions. PBL assesses processes of learning as well as knowledge. But knowledge may not be always increased.¹⁹ Incorporation of critical thinking, problem solving skills, interactive qualities, communication techniques are important for effective learning.⁷ The tutors’ role was well appreciated by students. They found tutors to be much helpful in achieving different strategies of PBL as that of other studies.^{9,10}

In this COVID-19 pandemic hit situation, we only have been delivering online lectures, mostly didactic. It has been a year online conferencing has been practiced. From this study, we experienced that online PBL could be conducted effectively as in other similar studies.²⁰⁻²² This approach will be helpful in breaking monotony of students to only didactic lectures. Online PBL was found to be as effective as physical PBL as in other study.²⁰ Though students were exhausted with online education, they actively participated in online PBL. At end of session, they provided feedback that they were looking forward to similar sessions in future as it enhanced their self- learning capabilities.

Focussed group discussion of tutors was conducted after the PBL session. Similar to students, tutors felt that PBL was effective and enjoyable method, as results presented by other studies.^{9,20} Tutors realized that this new teaching-learning approach benefitted them as they got an opportunity to be oriented to multiple aspects of learning. Their interaction with students increased. Integration of subjects provided them different perspectives to the same disease, apart from designing aspects. They also realized that learning of student was better with this method. They suggested for proper planning and coordination in future.

This method could be implemented for an integrated approach to other common problems included in curriculum. This strategy can be expanded to other faculties of the university too like nursing, medical,

paramedical courses. It is recommended to GMC to start with PBL in near future in their courses.

The limitation was small sample size. Though tutors were already exposed to PBL as a tutor and trainee, adequate training before the session was not provided due to COVID 19 just hitting the road and creating a lot of confusion among us on how to proceed with study.

CONCLUSIONS

The influence of discussion among participants, content tested, course objectives, reference literature during the PBL session were agreed upon by majority of the students. The tutors' role was acknowledged by students in terms of stimulation to self-directed, active, collaborative and contextual learning. Although there was increase in correct responses in post-test of evaluation questions, there was not increment in all the questions.

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