

Comparative Perception of Undergraduate Medical and Dental Students between Case-Based Learning and Problem-Based Learning in Karachi

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ABSTRACT

Background: Teaching methodologies that govern self-directed learning skills include problem-based learning (PBL) and case-based learning (CBL). Both undergraduate and graduate curriculum in Pakistan medical colleges frequently employ one or the other, depending on the situation. The objective of our research was to contrast PBL and CBL in the undergraduate medical curriculum based on the perceptions of the students who had seen this change in learning methodologies.

Method: It was a cross-sectional study conducted between March and June 2022 at a medical university in Karachi. A closed ended self-administered questionnaire with fourteen questions was prepared and distributed to 150 student. The responses to the questions were dichotomous in favor of problem based learning. Third and second year MBBS and BDS students of both genders, and socioeconomic status were included in this study. Student responses on the usefulness of PBL were obtained on a 5-point Likert scale, and results were compared using the chi square test.

Result: In general, the learners were positive about all of the items in favor of PBL, such as self-directed learning, critical thinking, identifying objectives, identifying knowledge gaps, and improved problem-solving skills.

Conclusion: Problem based learning is a preferred instructional strategy as compared to case base learning from perspective of the student.

Keywords: Problem-based learning (PBL), Case-based learning (CBL), Medical students, Dental students, Perception.

INTRODUCTION

Medical professionals have a social obligation to maintain their skills and expertise in order to maintain perpetual learning (1). They must be capable of problem-solving, decision-making, and clinical judgment. Medical boards all over the world have recognized the importance of developing these skills as a lifelong endeavor and have proposed that these competencies be enhanced and assessed through the educational system (2, 3). Considering the important position of a healthcare professional in society, healthcare institutions aim to ensure that learners have been provided with the necessary self-directed learning (SDL). It consists of stages designed to increase learning independence, which eventually leads to self-regulated learning (SRL) (4). The former is a catch-all term for a variety of procedures such as setting goals, cognitive processing, and self-evaluation that must be carried out in order for the medical profession to continue its exponential development (5).

In medical education, problem-based learning (PBL) and case-based learning (CBL) have evolved into beneficial methods of learning in which students clear the majority of their confusion and misconceptions through discussions in small groups with other students and instructors (6, 7).

Problem-based learning (PBL) is an instructional strategy that represents a creative approach to the teaching and learning process. PBL is a student-centered education that employs an inquiry-driven tutorial method of learning (8). PBL is frequently employed in medical school and health professions in conjunction with conventional educational methodologies, as it assists students enhance the higher-order thinking abilities required to be effective in the medical field (7). A PBL consists of a scenario created from the objectives addressed in weekly lectures. The scenario can be reflected as a written description or as representations, images, videos, or simulations (9).

It generally includes a series of descriptive situations that need to be explained and resolved. These depictions guide students to SRL with established objectives (8) and prepare them to "engage in educational activities defined by himself or herself, instead of by a teacher (10)."

CBL is a medical education method that uses real-world medical problems to prepare students for clinical practice. These problems are associated with theory in the events through the

application of theoretical understanding, and motivate the use of inquiry-based learning (11). Case-based learning is a type of common educational class. It typically consists of provided scenarios consistent with specified objectives for learning with educational value that piques interest, empathizes with individuals, and generally is applicable (12, 13).

As a result of the integrated introduced by the medical council, multiple healthcare institutions in Pakistan are now implementing and some have already implemented PBL alongside CBL in their curriculum. Therefore, the goal of our study was to compare CBL and PBL based on the perceptions of students who had witnessed the transition of learning methodologies in the undergraduate medical curriculum.

MATERIAL AND METHODS

After receiving the approval, the cross-sectional comparison research was carried out from March to June 2022 at a medical university of Karachi. Third and second year students MBBS and BDS respectively of both genders, ethnic origin, and socioeconomic status have been included in this study. Students from other academic years were excluded from the investigation. A total of ten CBLs and twelve PBLs were conducted in both years. After written informed consent, 100 third-year MBBS and 50 second-year BDS students were included through convenience sampling. For ease of discussion, the the150 students were divided into three small groups of 50 students each. The cases of CBL to be addressed were assigned four days ahead of time and for PBL it was given at the time of the session by the facilitators. Each session was scheduled for two hours.

The questionnaire was piloted and validated on a group of 20 students. The study questionnaire reliability was calculated by Cronbach's alpha. The first section of the questionnaire included the demographic data of the study participants and in the second section the instrument used for the research was a 14-item questionnaire which included statements about the advantages of PBL over CBL, as well as its significance in the improvement of clinical skills. The five-point Likert scale responses were merged into 3 different categorical variables: "agree" (strongly agree plus agree), "neutral," and "disagree"(strongly disagree plus disagree) since the concurred related items highlighted the score for a group of statements.

Statistical Analysis: SPSS (Statistical Package for Social Sciences) were used to analyze the data. The frequency of all questions was calculated to assess students' perceptions. To calculate the responses, agree was considered a positive response, neutral as not sure, and disagree as a negative response. The Chi square test was employed for contrasting results; a p-value of 0.05 was considered significant.

RESULTS

In this study, 150 undergraduate medical and dental students (males 32%, females 68%) participated. The average age of the participants was 21.24 ± 1.34 (19-22) years. As shown in **Table 1**, 100 medical and 50 dental students took part in the study.

Table 1: Demographics of the study participants

Demographics	No of students' n (%)
Age (years)	150 Mean \pm S.D 21.24 ± 1.34
Gender	n (%)
• Male	48 (32)
• Female	102 (68)
Undergraduate	n (%)
• Medical	100 (66)
• Dental	50 (34)

There were no significant variations in opinions regarding the statements based on discipline. Overall, students' perceptions of PBL sessions were positive. PBL is an interesting and engaging method of teaching and learning, according to 86% of students, while approximately 5% disagree.

In case of PBL, 80% of the students found preparing learning objectives help them better understanding the objective.

According to 77% of students, PBL helped them identify knowledge gaps, and 80.7% believed that PBL organizes knowledge around problems rather than disciplines and improves areas of weakness, which is 83% higher than CBL.

In the context of PBL, the majority of students (69.3%) discovered that they took responsibility for their own learning; additionally, the students (76.7%) were capable of actively processing information, and 68.7% believed that it helped them use their previous understanding to further clarify their knowledge far more than CBL.

PBL motivated self-directed learning for 91.3% of undergraduate students, but 5.3% were unsure and 3.3% disagreed. The majority of students believed they could make decisions, solve problems (84.7%), and think critically (88%) in the face of challenges.

Furthermore, PBL encouraged learners to improve their resource utilization skills.

Table 2: Perceptions of Undergraduate Medical and Dental Students toward PBL in comparison to CBL (n=150)

Item No.	Statement	Category	n (%)	Medical students	Dental students	p-value
1.	The PBL session is interesting and engaging than CBL	Agree Neutral Disagree	129 (86) 14 (9.3) 07 (4.7)	82 12 06	47 02 01	0.13
2.	PBL improves better understanding of the objectives	Agree Neutral Disagree	120 (80) 11 (7.3) 19 (12.7)	79 05 16	41 06 03	0.08
3.	PBL identifies knowledge gaps more effectively than CBL	Agree Neutral Disagree	116 (77.3) 07 (4.7) 27 (18)	82 03 15	40 04 06	0.36
4.	PBL allows learners to activate prior knowledge and expand their knowledge.	Agree Neutral Disagree	103 (68.7) 35 (23.3) 12 (8)	67 25 08	36 10 04	0.78
5.	PBL organizes knowledge around problems rather than disciplines.	Agree Neutral Disagree	121 (80.7) 18 (12) 11 (7.3)	77 13 10	44 05 01	0.16
6.	In PBL, the students accept responsibility for their own learning.	Agree Neutral Disagree	104 (69.3) 10 (6.7) 36 (24)	68 06 26	36 04 10	0.67
7.	Students become active information processors in PBL.	Agree Neutral Disagree	115 (76.7) 10 (6.7) 25 (16.7)	75 06 19	40 04 06	0.52
8.	PBL is more effective than CBL in identifying areas of weakness for improvement.	Agree Neutral Disagree	125 (83.3) 11 (7.3) 14 (9.3)	83 06 11	42 05 03	0.44
9.	PBL enhances decision-making abilities more than CBL.	Agree Neutral Disagree	121 (80.7) 11 (7.3) 18 (12)	81 06 13	40 05 05	0.61
10.	PBL promotes my self-directed learning on the topic	Agree Neutral Disagree	137 (91.3) 08 (5.3) 05 (3.3)	89 07 04	48 01 01	0.34
11.	PBL develops critical reasoning skills more than CBL.	Agree Neutral Disagree	132 (88) 11 (7.3) 07 (4.7)	87 08 05	45 03 02	0.86
12.	PBL enhances problem-solving abilities more than CBL	Agree Neutral Disagree	127 (84.7) 13 (8.7) 10 (6.7)	82 10 08	45 03 02	0.51
13.	PBL enhances communication skills more than CBL	Agree Neutral Disagree	132 (88) 08 (5.3) 10 (6.7)	90 04 06	42 04 04	0.43
14.	PBL encourages stronger skills in using resources	Agree Neutral Disagree	119 (79.3) 27 (18) 04 (2.7)	77 20 03	42 07 01	0.60

Abbreviation: PBL- problem-based learning, CBL-Case based learning

p-value: < 0.05 = significant, percentage and frequency was used, chi-square was applied (Medical and Dental)

DISCUSSION

There has been much debate about inquiry-based teaching methodologies that has enhance multiple learning abilities of the student. Indeed, it is theorized that a high level of student-directed learning allows students to actively identify their learning needs, set learning objectives, and determine the resources required to finish the assignment (14, 15). Among these inquiry based methodologies Case-Based Learning (CBL) and Problem-Based

Learning (PBL) are two methods that can be used in educational institutions to bridge the gap between academic training and clinical practice (16).

This study found that PBL significantly outperformed CBL in conceptual comprehension as perceived by students. Despite the fact that PBL did not include direct instructor guidance, the findings suggested that a greater emphasis on student-directed learning could result in a higher level of knowledge about concepts. In our

study, third-year undergraduate medical students and second-year dental students found the PBL strategy more interesting and engaging than the CBL strategy. Furthermore, PBL problems elicited situational interest, which increased interest in learning, which is consistent with other studies (17-19). The learners in the present research found PBL to be beneficial in meeting the objectives for learning, which corresponds to a research study carried out in Nigeria, in which a large proportion of those who participated felt that PBL sessions were preferred for meeting learning objectives, providing better fact-based knowledge as well as promoting better student involvement in the process of learning (20).

Active learning methods have been found to allow students to build on prior knowledge. Yet it is also essential to recognize that students may have different levels of prior knowledge and competencies, and their rate of obtaining new competencies may vary greatly depending on the type of active learning process used (21) and PBL also initiates knowledge-seeking behavior with the goal of identifying knowledge gaps by integrating new knowledge into existing knowledge structures (22). According to the learner in this study, PBL as a learning method helps more to use prior knowledge to build new knowledge, whereas CBL relies more on existing knowledge. Similarly, Shigli et al. consider that the CBL instructional strategy necessitates students to employ their existing knowledge and clinical expertise to solve clinical issues (23). On the other hand, Haley et al. compared CBL to PBL and discovered that PBL, like our study, identifies knowledge gaps (24).

In our study, students believed that PBL gave them responsibility for analysing their own learning. Similarly, Pinto et al also mentioned that PBL is more multifaceted and demanding than CBL because it enables learners to take responsibility for their own learning (16).

In the present study learners were unable to make immediate decisions during CBL sessions because they were not given the opportunity to consider the management of the disease and therapy; rather, the pathology of the medical condition was explained. During PBL, learners use their capacity for decision-making to resolve problems by selecting one course of action from multiple potential options, which may be useful in the future. In a related study of nursing professionals, those who completed a PBL-based curriculum demonstrated competencies of decision making and a willingness to learn (25).

Educators are struggling to find effective instructional methods that promote critical thinking and long-term self-directed learning. PBL might help in shifting teaching away from rote memorization and towards self-regulated and critical thinking (26). The current study emphasizes the significance of PBL as the most effective method of promoting critical thinking and self-directed learning. This was consistent with the findings of another Ugandan study (27) as well as a study comparing CBL (28).

In the present study, most students thought PBL enhanced their capacity for problem-solving and communicated satisfaction with the PBL approach to learning when compared to CBL. In accordance with a study carried out at Qassim University, the Problem-Based Learning (PBL) system modified the problem-solving skills of students of all years (18).

Communication is another crucial aspect in the field of medicine. Students in our study reported that those who have significant difficulties communicating ideas are more likely to succeed and clear their concepts in a PBL program, as PBL requires interaction and independent learning which is consistent with the study (29).

Furthermore, because pre-reading material is not provided beforehand, PBL learning methodologies encourage students to use websites and books for reference. According to one study, students learned a lot from online PBL sessions through different resources such as textbooks and many other (30).

CONCLUSION

As an instructional strategy, students favor problem-based learning over case-based learning. The evidence suggests that the learner favors problem-based learning. It involves problem-solving, active critical thinking, self-directed learning, and students taking ownership of their own learning, all of which are crucial components of the medical field's decision-making process. It emphasizes character development as well as contextual knowledge, transforming an unprepared medical student into a capable healthcare worker.

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