

Investigating Third-Year MBBS Students' Preferences for Various Learning Approaches in Forensic Medicine: A Cross-sectional Study

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ABSTRACT

Background: Medical education forms the foundation for competent and compassionate healthcare professionals. Learning Forensic Medicine and Toxicology plays a crucial role in understanding the medico-legal aspects. Teaching comprises all basic, pre-clinical and practical aspects of the subject and provides scientific expertise in investigating deaths, injuries, and poisoning cases. Thus teaching the subject with core concepts understandable to the intended audience is of paramount importance yet has not been explored in this particular subject. Problem-based learning (PBL) is a widely used educational approach in medical education, given the fact the study aims to investigate preferences about different approaches of PBL learning.

Subjects and methods: The study was a descriptive cross-sectional study carried out at the Department of Forensic Medicine and Toxicology, Sahara Medical College, Narowal from January to December 2023. The sample size of 100 students was determined using standard educational research practices, considering the course enrollment, expected response rate, and statistical power. This was based on a 95% confidence level, a 5% margin of error, and a population of 513, ensuring precise findings. A pretested questionnaire was used as the data collection tool to assess student preferences on student-centred learning, use of authentic problems, collaborative learning, integration of knowledge and skills, self-directed learning, reflection and evaluation. Data was analyzed using statistical software such as SPSS version 26.

Results: The students highly valued student-centred learning (93%) and reflection and evaluation (100%). Preferences were mixed for aspects like authentic problems (73% positive, 27% concern), collaborative learning (59% positive, 41% concern), and integration of knowledge and skills (71% positive, 29% concern). Most students (89%) appreciated self-directed learning, with some concerns (11%).

Conclusion: The study revealed that students highly valued student-centred learning and reflection in PBL while expressing concerns about authentic problems, collaborative learning and integration of knowledge and skills. Addressing concerns through curriculum refinement can enhance student engagement and skill development in Forensic Medicine. Further research with diverse populations is needed to understand the broader impact of PBL on learning outcomes. The study revealed interventional significance in terms of improvement in academic grades of PBL on learning outcomes.

Keywords:

Problem-Based Learning, Forensic Medicine, Effectiveness, Student Preferences, Self-Directed Learning

INTRODUCTION

Medical schools divide the curricula into two main domains basic or preclinical subjects and clinical subjects. In the preclinical subjects, Problem-Based Learning (PBL) encompasses the same sphere as Case Based Learning (CBL) in the clinical subjects. PBL is a pedagogical method that evolved during the latter half

of the 20th Century as a mode of teaching in medical education.¹ PBL is a pedagogical method that evolved during the latter half of the 20th century as a mode of teaching in medical education. In this method of teaching the learners are provided a material with certain given instructions to memorize their prior knowledge to construct their answers. By having said that PBL is considered as a platform of promotion of active learning through given questions which emphasizes the real world problems actually happening in the life.² In the first instance PBL was designed for medical education is now being adapted by other

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disciplines of higher education as the most effective tool of imparting, interpreting and challenge developing educational skills. The core concept is student learns the best when involved in problem-solving that are consistent to their field of education and real life.³

PBL is designed in a way that actual strength of the class is subdivided into small groups and solve the problems. The assigned problems are designed typically complex and open ended and may not have a single correct answer.⁴ The students of each group are supposed to work as team to research the problem, collect information and conclude a solution. In due process the students are although supposed to stay focus to question yet they are appreciated to ask questions. They are also encourage to seek new knowledge and to critically think for the potential solutions of the problems. The teacher facilitates students in this process and takes feedback helping the students to steer their problem solving capabilities.⁵ While inside the class of PBL the tutor typically presents a problem of the occurrence of real life scenario for the students to develop a schema for solution of that problem. The teacher or tutor can or may provide extra resource material and initial guidance just to push the students to have a quick start. The students are expected to take real ownership while on the road to the solution of given problem. The students will at a liberty to enjoy the luxury of conducting a research, consulting experts and developing their own ideas or simulations to devise the proposed solutions. Alongside the teacher helps, guides, instructs and seeks feedback to refine and nourish their problem-solving capacities.⁶

The PBL is notorious for its time-consuming limitations.⁷ Besides, PBL intensively utilizes resources and could be a potential limitation of resource-limited institutes/sectors.⁸ The other limitation is to produce and develop high-quality problems or scenarios.⁹ Student diversification is still another limitation of the PBL as some students may cope with open-ended nature of PBL with great difficulty and need additional guidance, attention and structure in addition to what has already been provided. In the end PBL may not be a choice for all subjects/disciplines and all kinds of teachers/tutors who may have their preferences and comfort zones for other methods.¹⁰ The aim was to identify the aspects students found most valuable and those that required improvement.

SUBJECTS AND METHODS

This cross-sectional study was conducted at Sahara Medical College Narowal, Pakistan, during the

academic year for the session 2022-23 expanding from January 2023 to December 2023. The study focused on the academic part of the calendar year, excluding holiday periods examination schedules.

The participants were third-year MBBS students enrolled at Sahara Medical College Narowal. Participation was voluntary, and informed consent was obtained from all students before the commencement of the study. A convenience sampling technique was employed to recruit participants. A total of 100 students sample size was determined using a formula based on a confidence level of 95%, a margin of error of 5%, and assuming a population proportion of 50% with a population size of 513, resulting in a calculated sample size of 97 ± 3 , ensuring the precision of the study's findings. All those students who expressed willingness to participate after attending the sessions of teaching methodologies were included in the study and those reluctant or not being aware of the core concept of learning methods were excluded. Approval for the study was obtained from the Institutional Review Board of Sahara Medical College Narowal. The study adhered to the ethical principles outlined in the Declaration of Helsinki. Participants were informed about the purpose of the study, their right to withdraw at any point without consequences, and the confidentiality of their responses. The study participants were given an opportunity to the sessions of the different learning methods to be assessed at the end of academic year to deliberate on their preferential choices on a detailed questionnaire for choosing the right options. The study measured through Likert scale like the degree of agreement or disagreement with specific aspects of PBL such as student-centred learning, integration of knowledge and skills, collaborative learning, self-directed learning and reflection & evaluation. Quantitative data from the Likert scale items were analyzed using descriptive statistics (frequencies, percentages). Open-ended responses were analyzed thematically to identify recurring themes and patterns.

The positive or concerned behavior were observed through preferences recorded via a questionnaire-based data collection approach. It consisted of Likert Scale items commonly used in educational research to assess attitudes, opinions or preferences or responses to rate their level of agreement or disagreement with statements related to teaching pedagogies.

RESULTS

All the 100 students inclusive of all the male and female students were the participants in the research project. Intentionally no gender disparity was considered for the

Table 1: Students response for problem based learning perspectives

PBL learning aspect	Students response		Differential analysis
	Preferred by	Showed a concern	
Authentic and Ill-defined Problems	73	27	Major Portion 73%
Student-Centered Learning	93	3	Near Total
Collaborative Learning	59	41	Insignificant
Self-Directed Learning	89	11	Significant
Facilitating Role of the Instructor	90	10	Major Portion 90%
Integration of Knowledge and Skills	71	29	Major Portion 71%
Reflection and Evaluation	100	0	Total
Response Ratio	68%	32%	100%

research project under study. The study included 37 males making just higher the proportion amounting to one-third of the sample size. Whereas, there were 63 females almost two-third of the entire population under study. Learning Perspectives within the PBL Method: Following perspectives were critically analyzed in the study. Use of authentic problems involved presenting real-world scenarios or cases relevant to the subject matter. In the other perspective of PBL, the student centered learning the subjects were given the opportunity to emphasize on their own active involvement and self-accountability. Collaborative learning which encouraged students to work in small groups sharing knowledge, developing solutions to get engaged into a team work. Self-directed learning empowered students to set their own learning goals within given resources to manage their own learning skills promoting autonomy and life-long learning skills. Integration of knowledge-and-skill helped on focusing to connect different concepts and disciplines within the context of solving the problems complex in nature to understand otherwise. Reflection and evaluation provided opportunities to critically reflect on their learning experiences to assess their own progress and receive feedback in terms of their own understanding. The research participant's detailed responses are depicted in Table 1.

This study investigated the preferences of 100 third-year MBBS students towards various learning aspects within a Problem-Based Learning (PBL) curriculum while teaching the subject of Forensic Medicine and Toxicology, a vital portion of the third professional MBBS in university examinations. The findings offer valuable insights into the strengths and potential areas for improvement in PBL implementation for medical education. The overwhelming positive response towards student-centered learning (93%) and reflection and evaluation (100%) reaffirms the core principles of PBL. Students appreciate taking ownership of their learning journey, actively engaging with the material, and critically

reflecting on their progress. This aligns with constructivist learning theory, where knowledge is actively built through experience and reflection. By fostering a student-centered environment and encouraging regular reflection, educators can create a more engaging and meaningful learning experience.

DISCUSSION

About student centered learning¹¹, there were 93% of students who responded it positively, indicating a strong preference for active learning approaches where they take center stage in the learning process. When it came to analyzing the reflection and evaluation¹², the entire 100% of students responded it positively, suggesting that reflection and evaluation are seen as crucial components of their learning experience. When the facilitating role of the instructor¹³ was analyzed there were 90% of the students who responded it positively, indicating appreciation for instructors who act as guides and facilitators rather than solely delivering lectures merely reading PowerPoint slides like dictation.

There were 73% of students responded authentic and ill-defined problems¹⁴ positively, while 27% showed some concern being unable to understand the core subject. This suggests that while a majority appreciate the real-world nature of PBL problems, some students might find them challenging or require additional support. A wide portion of 71% of students responded integration of knowledge and skills^{11,15} positively with 29% showing some concern. This indicates that while most students value the integration of knowledge and skills, some might require more guidance or opportunities to practice this effectively. A portion of student comprising about 59% responded collaborative learning positively with remainders of 41% showed some concern¹³. This suggests that collaborative learning might not be equally preferred by all students, and some might require additional strategies to foster effective collaboration within groups^{16,17}.

A very well significant 89% of students responded self-directed learning¹⁸ positively, while 11% showed some concern. This suggests that while most students value taking ownership of their learning, some might require additional support or guidance to develop their self-directed learning skills¹⁹. To put it into a nutshell the research suggest that students generally appreciate the core principles of PBL, such as student-centered learning, reflection, and instructor facilitation²⁰. However, there are also areas for improvement, particularly in addressing concerns regarding the use of authentic and ill-defined problems, integrating knowledge and skills, and promoting effective collaboration^{21,22}.

While a majority of students value the use of authentic and ill-defined problems (73%), a significant portion (27%) expressed concerns. This suggests the need for effective scaffolding strategies. Providing clear learning objectives, guiding questions, and access to relevant resources can equip students to grapple with complex problems without feeling overwhelmed. Additionally, fostering a supportive learning environment where students feel comfortable asking questions and seeking help is crucial for maximizing the benefits of authentic problem-solving²³. Similarly, the mixed preferences towards collaborative learning (59% positive, 41% with concerns) warrant further exploration. Collaborative learning can be a powerful tool for developing communication, teamwork, and critical thinking skills. However, not all students might possess the necessary skills or feel comfortable working in groups. Implementing strategies like clear group roles, training in effective communication, and fostering a culture of inclusivity can help optimize the collaborative learning experience for all students¹⁵.

The finding that 71% of students value the integration of knowledge and skills, with some concerns (29%), suggests a need for further refinement in this area. PBL curriculum design should ensure clear connections between different disciplines and provide opportunities for students to apply their knowledge and skills in practical contexts. The method can involve all types of case studies, clinical case histories or scenarios and even simulations for students to integrate their learning with those real life scenarios to understand the core concept of the individual method. Further guiding them through the explicit instruction on how to integrate knowledge and student learned pre-existing skill would definitely further enhance student learning outcomes²⁴.

Majority of students say 89% showed interest in taking responsibility of their own learning while the remaining 11% were not agree-able to take the ownership. This lays stress on provision of enough guidance and support to help learners re-define their self-directed-learning skills. The frame works providing clear learning objectives, significant feedback provision and letting opportunities for provision of self-asesment may strengthen students to take over of their own short comings in terms of learning the academics on smooth sailing steady track. It is advisable that students must be encouraged to be indulged in metacognitive s domain to be emphasized on their learning to identify their own areas of improvement in terms of enhancing self-directed learning²⁵.

CONCLUSION

The study shed light on the preferences of MBBS student while learning different aspects of Problem-Based-Learning (PBL) curriculum revealing immense contributions for effective teaching pedagogy in the sphere of medical education especially the subject of forensic medicine. The study highlighted that student adhered to the core concepts like student-centered learning and reflection where areas of improvement emerged regarding actual problems, collaborated learning and knowledge apprehension. Modifications in the favor of students pointed out aspects are worthwhile for enhancing of the benefits of PBL. Application of effective strategies can make the students learn to navigate critical and complex issues more efficiently. Implementation of effective communication skills and inclusivity can enhance collaborated learning capabilities. Further shear instructions and critical opportunities can enhance the incorporation of knowledge and learning of skills. Providing enough applicable skills for self-directed learning by valuable guidance and empowerment through resource allocation students can take responsibility of their learning skills and objectives. We strong advise that implementation of such strategies can transform learning experience and address the challenges faced by the students amid the growing need of addressing the challenges in teaching forensic medicine and medical education landscape.

REFERENCES

1. Robinson L. Small groups, big possibilities: radical pedagogical approaches to critical small-group learning in medical education. *Canadian Medical Education Journal*. 2023;14(2):178.
2. Loyens SM, Van Meerten JE, Schaap L, Wijnia L. Situating higher-order, critical, and critical-analytic thinking in problem-

- and project-based learning environments: A systematic review. *Educational Psychology Review*. 2023;35(2):39.
3. Lee N, Jo M. Exploring problem-based learning curricula in the metaverse: The hospitality students' perspective. *Journal of Hospitality, Leisure, Sport & Tourism Education*. 2023 ;32:100427.
 4. Salter MM. Faculty Beliefs on Active Learning Strategies in Higher Education: Identification of Predictors for Use of Active Learning (Doctoral dissertation, University of South Alabama).1-24
 5. Ghasemi S, Bazrafkan L, Shojaei A, Rakhshani T, Shokrpour N. Faculty development strategies to empower university teachers by their educational role: A qualitative study on the faculty members and students' experiences at Iranian universities of medical sciences. *BMC Medical Education*. 2023;23(1):260.
 6. Forbes D, Gedera D, Brown C, Hartnett M, Datt A. Practical learning in hybrid environments: Can remote learning be active, authentic, and real?. *Distance Education*. 2023 Apr 3;44(2):362-79.
 7. Ban, Q. The Role of Teacher in the PBL Teaching Model. in 2nd International Conference on Education, Language and Art (ICELA 2022). 2023. Atlantis Press.232-41.
 8. Dowie A. Ethical sense, medical ethics education, and maieutics. *Medical Teacher*. 2023 ;45(8):838-44.
 9. MacNeill H, Masters K, Nemethy K, Correia R. Online learning in health professions education. Part 1: Teaching and learning in online environments: AMEE Guide No. 161. *Medical Teacher*. 2024;46(1):4-17.
 10. Shawwa L, Yousef MK, Yousef M. Does Gender, Academic Status, Years of Teaching Experience, and Discipline Affiliation Affect Strategies Used to Promote Creativity in Medical Education at King Abdulaziz University?. *Cureus*. 2023 Mar 13;15(3).12-18.
 11. Dasgupta A. Problem based learning: its application in Medical Education. *J West Bengal Univ Health Sci*. 2020;1(2):11-8..
 12. Al Ghouti M. Impacts on Student Learning and Skills and Implementation Challenges of Two Student-Centered Learning Methods Applied in Online Education.
 13. Trullàs JC, Blay C, Sarri E, Pujol R. Effectiveness of problem-based learning methodology in undergraduate medical education: a scoping review. *BMC medical education*. 2022;22(1):104.
 14. Seidel LF, Lewis JB, Ritvo RA, Kent KE. Using problem-based learning to prepare students and improve academic programs. *Journal of Health Administration Education*. 2022;39(1):85-106.
 15. Elshama SS. How to apply problem-based learning in medical education? A critical review. *Iberoamerican Journal of Medicine*. 2020;2(1):14-8.
 16. Raisolsadat MA, Sanjar Moussavi N, Farajpour A, Meshkinyazd A. Investigating the effects of problem-based learning in a virtual group on collaborative learning, social presence and student satisfaction in surgery department. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*. 2020;11(2):102-11.
 17. Burgess A, Bleasel J, Hickson J, Guler C, Kalman E, Haq I. Team-based learning replaces problem-based learning at a large medical school. *BMC Medical Education*. 2020;20:1-8.
 18. Manuaba IB, -No Y, Wu CC. The effectiveness of problem based learning in improving critical thinking, problem-solving and self-directed learning in first-year medical students: A meta-analysis. *PloS one*. 2022;17(11):e0277339..
 19. Buch AC, Rathod H, Naik MD. Scope and challenges of self-directed learning in undergraduate medical education: A systematic review. *Journal of medical education*. 2021;20(1).11-17
 20. Hill M, Peters M, Salvaggio M, Vinnedge J, Darden A. Implementation and evaluation of a self-directed learning activity for first-year medical students. *Medical education online*. 2020;25(1):1717780.
 21. Kemp K, Baxa D, Cortes C. Exploration of a collaborative self-directed learning model in medical education. *Medical science educator*. 2022 ;32(1):195-207.
 22. Ramamurthy S, Er HM, Devi Nadarajah V, Radhakrishnan AK. Medical students' orientation toward lifelong learning in an outcome-based curriculum and the lessons learnt. *Medical teacher*. 2021;43(sup1):S6-11.
 23. Shivapurkar M, Bhatia S, Ahmed I. Problem-based learning for cybersecurity education. In *Journal of The Colloquium for Information Systems Security Education 2020* ;7(1):6-6).
 24. Khalil MK, Giannaris EL, Lee V, Baatar D, Richter S, Johansen KS, Mishall PL. Integration of clinical anatomical sciences in medical education: design, development and implementation strategies. *Clinical Anatomy*. 2021;34(5):785-93.
 25. Kidane HH, Roebertsen H, Van der Vleuten CP. Students' perceptions towards self-directed learning in Ethiopian medical schools with new innovative curriculum: a mixed-method study. *BMC medical education*. 2020;20:1-0.-10.