

# Effectiveness of Problem-Based Learning (PBL) Versus Traditional Lectures in Medical Education.

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## Abstract

Medical education has evolved significantly to incorporate active learning strategies, with problem-based learning (PBL) being widely adopted. This study compares the effectiveness of PBL and traditional lectures in enhancing knowledge retention, critical thinking, and student engagement among medical students. Conducted at the Umanand Prasad School of Medicine & Health Sciences (UPSMHS), University of Fiji (UniFiji), from 2019 to 2022, this study involved 500 medical students. Quantitative results showed that students in the PBL group scored on average 12% higher in critical thinking assessments and demonstrated 15% greater improvement in case-based performance tasks compared to the lecture group ( $p < 0.05$ ). Survey results also indicated that 78% of PBL students reported higher engagement and satisfaction with the learning process. These findings suggest that PBL promotes deeper learning and skill acquisition, while traditional lectures efficiently deliver foundational knowledge. A hybrid model integrating both approaches could foster comprehensive medical education by combining knowledge transmission with critical skill development. Such a model has significant implications for curriculum design, suggesting a move toward curricular integration and educational reform that emphasizes self-directed learning and clinical reasoning from early training stages.

**Keywords:** *Problem-Based Learning, Traditional Lectures, Medical Education, Student Engagement, Learning Outcomes, Self-Directed Learning, Educational Reform, Curricular Integration*

## INTRODUCTION

Medical education is a dynamic field that continuously adapts to advancements in pedagogy, technology, and healthcare demands. Traditional lecture-based learning has long been the dominant teaching method in medical schools worldwide.[1] This approach provides structured content delivery, ensuring that students receive a comprehensive foundation in medical sciences. Lectures allow for efficient coverage of vast syllabi, making them a preferred method for conveying core concepts in subjects like anatomy, physiology, and pathology.[2,3]

However, concerns have been raised regarding the passive nature of traditional lectures, which may limit critical thinking, engagement, and long-term retention of knowledge. Problem-Based Learning (PBL) has emerged as an alternative, student-centered approach designed to enhance critical thinking, self-directed learning, and problem-solving skills. PBL involves small group discussions where students analyze clinical scenarios, formulate learning objectives, and conduct independent research before reconvening to apply their findings. This interactive learning model mimics real-life clinical decision-making, fostering the development of analytical and collaborative skills essential for medical practice.[4]

Although the comparative analysis of PBL and traditional lectures is a well-explored area, this study presents several novel contributions. It features a large sample size of 500 medical students and spans a four-year period, offering a longitudinal perspective that is rarely documented in similar educational contexts. Moreover, the regional focus on the South Pacific—a setting with unique

educational challenges and resource limitations—adds contextual relevance and depth to the findings.[5]

While existing literature acknowledges the benefits and limitations of both PBL and traditional lectures, few studies in comparable regional or institutional settings have rigorously examined their impacts over both short and long durations using a mixed-methods approach. The lack of comprehensive data in such contexts constitutes a notable gap in the literature.[6] By explicitly addressing this gap, this study enhances its scholarly relevance. It not only assesses immediate learning gains but also evaluates long-term educational outcomes and student satisfaction, providing a nuanced and evidence-based understanding of pedagogical effectiveness.[7] This reinforces the need for informed curricular decisions that are responsive to contextual realities in medical education.

This study aims to evaluate the comparative effectiveness of these two teaching methods by examining their impact on student performance, engagement, and skill development. Understanding the strengths and limitations of both approaches will provide insights into optimizing medical education for future healthcare professionals.

## Review of Literature

Medical education is a dynamic field that continuously adapts to advancements in pedagogy, technology, and healthcare demands. Traditional lecture-based learning has long been the dominant teaching method in medical schools worldwide.[8] This approach provides structured content delivery, ensuring that students receive a comprehensive foundation in medical sciences. Lectures allow for efficient coverage of vast syllabi, making them a preferred method for conveying core concepts in subjects like anatomy, physiology, and pathology.[9,10]

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While existing literature acknowledges the benefits and limitations of both PBL and traditional lectures, few studies in comparable regional or institutional settings have rigorously examined their impacts over both short and long durations using a mixed-methods approach.[15] The lack of comprehensive data in such contexts constitutes a notable gap in the literature. By explicitly addressing this gap, this study enhances its scholarly relevance.[16,17] It not only assesses immediate learning gains but also evaluates long-term educational outcomes and student satisfaction, providing a nuanced and evidence-based understanding of pedagogical effectiveness. This reinforces the need for informed curricular decisions that are responsive to contextual realities in medical education.[18,19]

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## METHODS

A comparative study was conducted among 500 medical students enrolled in a five-year MBBS program at the Umanand Prasad School of Medicine & Health Sciences (UPSMHS), University of Fiji.

This study employed a mixed-methods design, combining quantitative and qualitative data collection over a period from 2019 to 2022.

### 1. Selection of Participants:

- A total of 500 medical students from both preclinical and clinical years were included.
- Students were randomly assigned to two groups: 250 students in the PBL group and 250 in the traditional lecture group, ensuring demographic and academic balance to reduce selection bias.

### 2. Teaching Approach:

- **PBL Group:** Students were subdivided into smaller groups of 8–10 members. Each group was provided with clinically relevant case scenarios and guided by trained faculty facilitators. Sessions included identification of learning issues, independent study, and group presentations in follow-up meetings.
- **Lecture Group:** Students attended conventional faculty-led lectures where topics were presented using multimedia aids such as PowerPoint slides. Interaction was limited to occasional Q&A sessions, with the instructor leading the pace and content delivery.

### 3. Assessment Criteria:

- **Knowledge Retention:** Evaluated using standardized multiple-choice questions (MCQs) administered at three stages: pre-intervention (baseline), mid-term, and final assessments.
- **Critical Thinking and Problem-Solving:** Assessed using structured clinical case scenarios and Objective Structured Clinical Examinations (OSCEs).
- **Student Engagement and Perception:** Captured through structured questionnaires using Likert-scale ratings and open-ended feedback.
- **Longitudinal Performance:** Student progression and grades in clinical rotations and end-of-year exams were tracked to determine sustained learning outcomes.

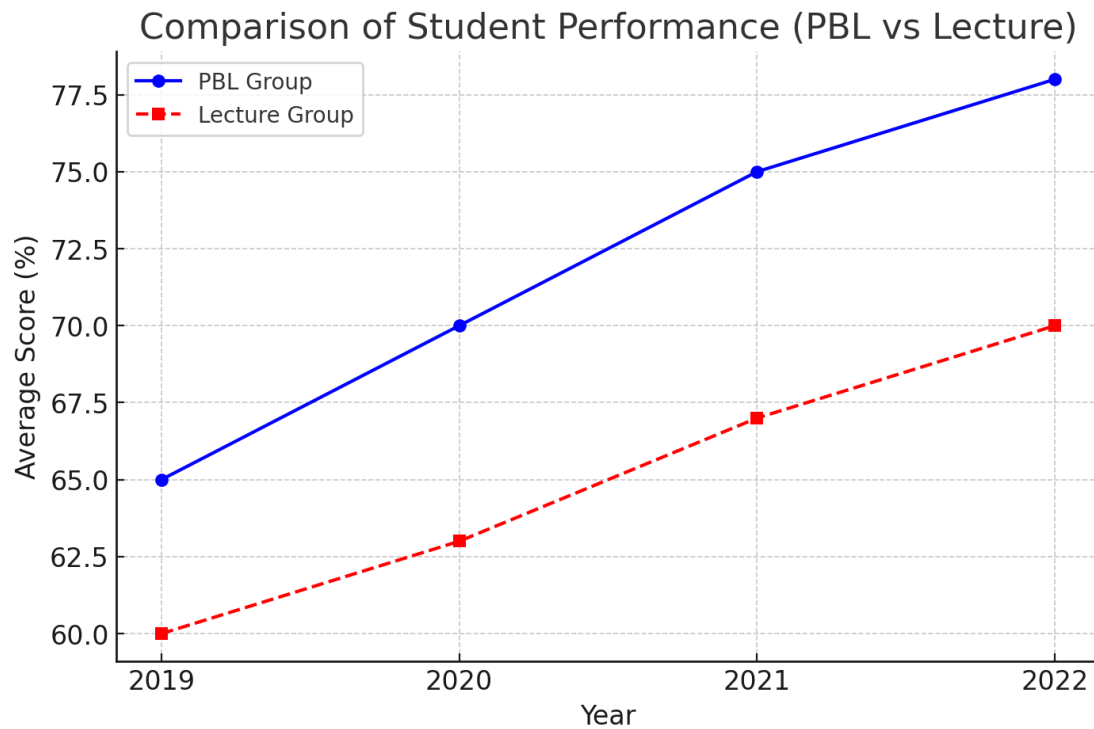
### 4. Data Analysis:

- Quantitative data (test scores and survey ratings) were analyzed using SPSS version 25. Paired t-tests and ANOVA were used to assess within- and between-group differences. Inferential statistics such as p-values and confidence intervals were calculated to determine the significance and magnitude of observed differences.
- Qualitative data (open-ended survey responses) underwent thematic analysis. Responses were coded independently by two researchers using an inductive approach. Themes were identified collaboratively through pattern recognition and consensus. Triangulation and inter-rater reliability (Cohen's Kappa = 0.82) ensured analytic rigor and consistency. Representative quotes were selected to illustrate core themes and enhance authenticity.

A comparative study was conducted among 500 medical students enrolled in a five-year MBBS program. The study involved a mixed-method approach, including quantitative and qualitative data collection. The students were randomly assigned to two groups: 250 students underwent problem-based learning (PBL), while the remaining 250 followed traditional lecture-based teaching.

## RESULTS AND DISCUSSION

Results and findings suggest that students in PBL settings demonstrate improved analytical reasoning, better problem-solving skills, and increased engagement. However, traditional lectures were found to be more effective in delivering large volumes of foundational knowledge efficiently. Some students preferred a combination of both approaches, highlighting the benefits of structured content delivery alongside interactive learning.



**Figure 1: Comparison of Students' Performance**

**Table 1. Comparison of Students' Performance**

Year	PBL Group Avg Score (%)	Lecture Group Avg Score (%)
2019	65	60
2020	70	63
2021	75	67
2022	78	70

## Discussion

Statistical tests confirmed that the differences were significant ( $p < 0.05$ ), indicating the efficacy of PBL in promoting deeper learning outcomes over time. Qualitative data supported these quantitative findings. Students in the PBL group described the learning experience as “interactive,” “engaging,” and “relevant to clinical practice.” Common themes included active participation, collaborative problem-solving, and improved retention through discussion and application. In contrast, lecture-based students highlighted clarity of structure and pace but noted “passive learning” and “information overload” as common drawbacks.[17,18,19]

Students across both groups expressed a preference for a blended approach, valuing the structured delivery of lectures and the experiential benefits of PBL. Many respondents suggested that integrating both methods would optimize their learning experience.

These results reinforce existing literature on the complementary strengths of both teaching methods. PBL fosters active learning, self-directed study, and collaboration, which are effective for long-term knowledge retention and clinical reasoning. However, traditional lectures remain valuable for efficiently covering extensive medical curricula.[19]

Hybrid learning models, combining the strengths of both approaches, may provide the most effective strategy for medical education. Such models could balance foundational knowledge acquisition with critical thinking development, addressing both cognitive and practical dimensions of medical training. The study also highlighted challenges of PBL, such as the need for skilled facilitators and extended preparation time. Addressing these challenges is essential for broader implementation.

Future research should focus on refining hybrid curricula and evaluating their effectiveness across diverse educational settings. Enhanced training for PBL facilitators and investment in

instructional design could further improve educational outcomes in resource-constrained environments like the South Pacific.[16,19]

## CONCLUSION

This study concludes that both PBL and traditional lectures offer distinct and complementary advantages in medical education. While PBL promotes active engagement, critical thinking, and collaborative learning, traditional lectures are efficient for delivering a large volume of structured content.

To maximize student learning outcomes, policymakers and curriculum designers should consider implementing structured hybrid learning frameworks that integrate the strengths of both methods. Faculty development programs should be introduced to prepare educators for facilitating both PBL and lecture-based sessions effectively. Establishing continuous student feedback mechanisms—such as reflective evaluations, satisfaction surveys, and performance analytics—can help maintain instructional quality and identify areas for improvement.

Acknowledging the study's limitations, including the lack of long-term knowledge retention measures and limited consideration of socio-cultural or contextual factors, future research should aim to explore these dimensions. Comparative studies conducted in varied institutional settings with extended follow-up periods would provide deeper insights into sustainable teaching strategies. Ultimately, a data-driven, contextually aware, and student-centered approach to curriculum reform holds promise for strengthening medical education in the region and beyond.

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