



KNOWLEDGE AND IMPACT OF CASE-BASED LEARNING ON THE ACADEMIC PERFORMANCE OF UNIVERSITY STUDENTS

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ABSTRACT

OBJECTIVE: The main objective of this study was to assess the impact of Case-Based Learning (CBL) as an instructional approach in fostering academic achievement, strengthening clinical reasoning abilities, and promoting active learning engagement among medical students at Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro.

METHODOLOGY: A cross-sectional analytical survey was conducted among 134 male undergraduate medical students at LUMHS, Jamshoro, selected through simple random sampling. Following informed consent, data were collected via a structured Google Form and analyzed using SPSS version 20.

RESULTS: A total of 134 medical students, predominantly aged between 15 and 30 years, participated in the study. The majority (64.18%) demonstrated moderate awareness of Case-Based Learning (CBL), while 14.93% and 11.94% reported high and very high awareness, respectively. Only 8.96% indicated poor or very poor awareness. Regarding academic impact, 50.75% of students agreed and 29.85% strongly agreed that CBL improved their academic performance, whereas 16.42% remained neutral and 2.99% disagreed. Overall, 94.03% of respondents expressed satisfaction with the CBL approach, with satisfaction notably higher among those with greater exposure to CBL sessions. These findings highlight a strongly positive perception and acceptance of CBL as an effective learning strategy among medical students.

CONCLUSION: Medical students viewed Case-Based Learning positively, recognizing its value in improving academic performance and clinical reasoning. Broader curricular integration and faculty training are essential to maximize its impact, fostering competent, analytical, and practice-ready future physicians.

KEYWORDS: Case-Based Learning, Medical Education, Academic Performance, Clinical Reasoning, Student Satisfaction, Active Learning Strategies

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INTRODUCTION: E-learning, which involves students accessing educational material from any location, has increasingly become a modern tool for delivering academic content. Despite its flexibility and convenience, e-learning presents several limitations, such as the instructor's reduced ability to assess student comprehension, limited opportunities for learners to raise questions or exchange ideas, and inconsistent quality of educational resources. [1] Consequently, there is a growing need to design structured and pedagogically sound e-learning systems that ensure meaningful learning experiences. [2]

Case-Based Learning (CBL) is an innovative educational method widely adopted in healthcare education, aiming to equip students with practical competencies through the analysis of real or simulated patient cases that reflect real-world clinical situations. [3-5] By exposing students to complex and often ambiguous clinical scenarios, CBL motivates them to apply theoretical knowledge to practical situations, thereby strengthening understanding and long-term retention.. [6, 7] This approach is consistent with the active learning framework, which emphasizes that students achieve more effective learning outcomes when they participate actively rather than receiving information passively. [8]

Research consistently supports the effectiveness of CBL in encouraging learners to collect, analyze, and apply information to problem-solving contexts, while also improving information retention and communication skills. [9-14]

The main goal of this study is to explore university students' awareness of Case-Based Learning and to evaluate its influence on academic performance. Specifically, it aims to measure students' knowledge and perceptions of CBL and assess its role in enhancing their learning outcomes. Understanding the influence of CBL on academic performance is essential for several reasons: first, it provides valuable insights into its effectiveness as a teaching model, guiding educators and curriculum developers in refining instructional design; second, it highlights the potential of CBL to prepare students for professional practice by developing critical thinking, decision-making, and analytical skills; and third, it adds to the existing body of evidence on innovative pedagogical approaches, offering a foundation for future educational research and advancement.

METHODOLOGY: A descriptive cross-sectional survey was carried out among 134 male medical students of Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro. Participants were selected through a simple random sampling technique.

After obtaining online informed consent, responses were collected via a structured Google Form.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 20. Quantitative variables were summarized as mean $\pm$ standard deviation (SD), while qualitative variables were presented as frequencies and percentages. The Chi-square test was applied to evaluate associations between categorical variables, with a p-value ≤ 0.05 considered statistically significant.

RESULTS: The study sought to explore students' perceptions and the overall impact of Case-Based Learning (CBL) across different age groups and academic levels. Through a structured survey, data were gathered to assess participants' awareness, satisfaction, and views on how CBL influenced their academic performance and clinical reasoning abilities. A total of 134 students participated, representing a wide age range.

Furthermore, participants represented different academic years, with the majority belonging to the 1st year (67.16%, 90 respondents), followed by the 5th year (17.91%, 24 respondents), 4th year (7.46%, 10 respondents), 2nd year (4.48%, 6 respondents), and 3rd year (2.99%, 4 respondents). This variation ensured a broad range of perspectives across different levels of academic advancement.

One of the initial survey questions assessed the respondents' level of awareness regarding Case-Based Learning (CBL). The findings revealed that a majority of students, particularly those in the early years of study, possessed a moderate level of awareness. Specifically, 64.18% (86 respondents) reported moderate awareness, followed by high awareness (14.93%, 20 respondents), very high awareness (11.94%, 16 respondents), and both poor and very poor awareness levels accounting for 4.48% (6 respondents) each. The pie chart below illustrates that although a substantial number of students are acquainted with CBL, there remains scope for enhancing awareness, particularly among the junior students. The survey further examined students' perceptions of the effect of Case-Based Learning (CBL) on their academic performance. Over half of the respondents (50.75%, 68 students) agreed that CBL had a positive impact on their academic outcomes, while (29.85%, 40 students) strongly agreed. A smaller group remained neutral (16.42%, 22 students), and only (2.99%, 4 students) disagreed.

This positive perception was more pronounced among senior students who had greater exposure to CBL within their curriculum.

The high level of agreement indicates that students view CBL as an effective method for deepening understanding and improving knowledge retention, ultimately enhancing academic achievement.

Another key aspect assessed in the survey was students' satisfaction with the CBL approach. The majority of respondents (94.03%, 126 students) reported being satisfied, whereas only (5.97%, 8 students) expressed dissatisfaction. Satisfaction was notably higher among those with more extensive experience of CBL. This relationship between exposure and satisfaction highlights the effectiveness of CBL in fulfilling students' learning needs and expectations. One of the core objectives of CBL is to improve clinical reasoning and knowledge. The survey results supported this objective, with (47.76%, 64 respondents) agreeing that CBL enhances their clinical reasoning skills and knowledge base, and (40.30%, 54 respondents) strongly agreeing. A smaller proportion remained neutral (11.94%, 16 respondents). The agreement was particularly strong among senior students, who are more likely to engage in clinical

scenarios and appreciate the practical application of theoretical knowledge. This finding highlights the importance of CBL in preparing students for real-world clinical practice. Comparative analysis across academic years revealed notable trends. Senior students (4th and 5th year) consistently rated the influence of Case-Based Learning (CBL) on academic achievement and clinical reasoning higher than junior students, likely due to greater exposure and experience with complex clinical cases. Their higher satisfaction levels indicate that CBL is particularly effective when implemented in advanced stages of the curriculum, where theoretical knowledge is applied to real-life scenarios.

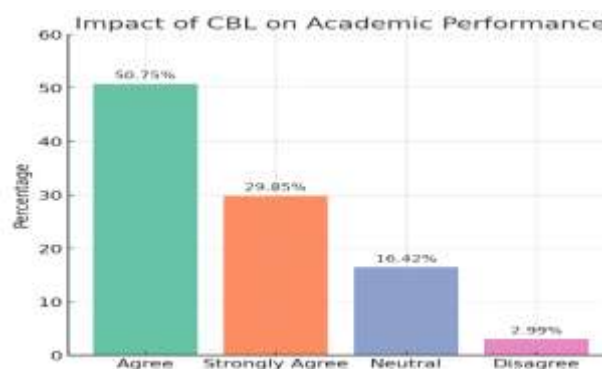
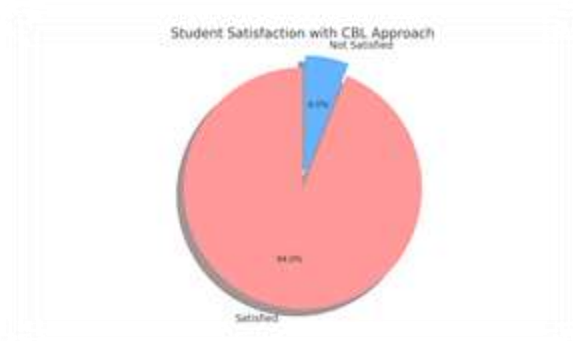
Qualitative feedback further reinforced these findings; students appreciated the interactive, engaging, and collaborative nature of CBL, which enhanced understanding, retention, and communication skills. However, some participants emphasized the need for clearer structure and improved resources to optimize the CBL experience.

TABLE 1: AGE GROUP DISTRIBUTION OF RESPONDENTS

Age group	Number	Percentage
15-20	82	61.19
21-30	52	38.81

TABLE 2: YEAR OF STUDY DISTRIBUTION OF RESPONDENTS

Year of Study	Number	Percentage
1st Year	90	67.16
2nd Year	6	4.48
3rd Year	4	2.99
4th Year	10	7.46
5th Year	24	17.91



DISCUSSION: The present study offers meaningful insights into students' perceptions and the overall impact of Case-Based Learning (CBL) across different academic levels and age groups. The strong levels of awareness and satisfaction reported particularly among senior students—highlight the effectiveness of

CBL as a teaching and learning strategy within medical education. The positive association observed between CBL, academic achievement, and clinical reasoning ability emphasizes its crucial role in equipping future clinicians with essential problem-solving and analytical skills.

These findings are consistent with a similar investigation conducted in Sudan. [15]

A substantial proportion of participants perceived CBL as advantageous to their academic performance, aligning with earlier research that demonstrates the benefits of interactive, student-centered learning models in enhancing comprehension and knowledge retention. The consensus among respondents that CBL strengthens both clinical reasoning and conceptual understanding reinforces the notion that experiential, case-driven approaches effectively bridge the gap between theoretical learning and real-world application. This evidence suggests that medical institutions should prioritize broader integration of CBL within the curriculum particularly in advanced years, where students can apply and refine clinical reasoning skills more effectively.

The high satisfaction levels observed among senior students also indicate that the efficacy of CBL increases with experience and repeated exposure. This has notable implications for curriculum design, suggesting that introducing CBL early and progressively increasing its complexity can nurture clinical reasoning in a structured manner. Moreover, the collaborative framework of CBL—highlighted through qualitative feedback—demonstrates its value in fostering teamwork, communication, and peer-to-peer learning, all of which are indispensable in clinical environments. These observations align closely with the outcomes reported in a recent systematic review. [16]

The current findings, showing marked improvement in students' knowledge and confidence following CBL exposure, further support the growing body of evidence endorsing active and participatory teaching methodologies in higher education. Reitinger et al. (2007) likewise observed enhanced confidence and understanding among interns in managing acute dyspnea after CBL-based sessions, though statistical significance was limited due to small sample size and participation. [17] Similarly, Oliván Blázquez et al. (2023) compared CBL with Photo voice, finding both methods highly effective in improving academic outcomes and student satisfaction, with CBL receiving higher ratings for facilitating new knowledge acquisition. These outcomes highlight the cognitive depth and meaningful learning stimulated by CBL. [18] In addition, Haffeejee (2021) demonstrated that participatory strategies such as Photo voice cultivate critical thinking and social awareness by linking theoretical concepts to community realities. Collectively, these studies strengthen the present findings that CBL enhances comprehension, confidence, critical reasoning, and engagement core attributes for both academic and professional excellence. [19]

The results can also be interpreted within the framework of motivational and behavioral learning theories. Maqableh et al. (2021) reported that students' academic success is strongly influenced by satisfaction, perceived informational value, and the intention to continue engaging with educational tools. In their proposed model, satisfaction and perceived value improved both performance and the intention to sustain learning engagement, with the latter acting as a mediator. Similarly, the increased confidence and knowledge observed in the current study imply that CBL promotes satisfaction and sustained participation through its interactive, problem-solving structure. By fostering intrinsic motivation and consistent engagement, CBL enables learners to internalize and apply concepts effectively—reflecting the positive mediating role of engagement described by Maqableh et al. (2021). [20]

Nevertheless, this study acknowledges several limitations. The relatively small sample size may limit generalizability, as the participants may not represent the wider student population. Furthermore, only male students were included, potentially omitting valuable perspectives from female learners. The predominance of first- and fifth-year respondents may also introduce sampling bias, underscoring the need for future studies to incorporate more balanced representation across all academic years for a broader understanding of CBL's educational impact.

Another constraint involves reliance on self-reported data, which may be influenced by subjective bias. Participants might have overstated satisfaction or perceived benefits due to social desirability or limited self-assessment. Subsequent research should therefore include objective metrics such as academic scores or standardized assessments of clinical reasoning to validate self-reported outcomes.

Additionally, while this study explores general perceptions of CBL, it does not delineate specific elements contributing to its success. Investigating factors such as case quality, facilitator effectiveness, and group dynamics would provide deeper insights into optimizing CBL design and delivery.

Qualitative responses further revealed certain challenges, including the need for clearer structure, stronger facilitation, and better resource availability. Although CBL was largely viewed as beneficial, these aspects suggest areas for improvement. Institutions should invest in faculty development and ensure adequate materials and guidance for CBL sessions. Addressing these gaps would likely enhance both the educational value and overall student satisfaction with the CBL approach.

CONCLUSION: This study underscores the constructive perception and measurable benefits of Case-Based Learning (CBL) among students, particularly in strengthening academic achievement and clinical reasoning competencies. The results advocate for the broader integration of CBL within medical curricula to promote active learning and critical thinking. Addressing implementation challenges—such as facilitator training, structural consistency, and adequate resource allocation—may further optimize its educational impact. Nonetheless, the study's limitations highlight the necessity for future investigations involving larger, gender-balanced, and more diverse cohorts, supported by objective performance metrics. Moreover, exploring the underlying pedagogical elements that drive the success of CBL will be essential for refining its design and maximizing its transformative potential in medical education.

Ethical Approval: This study received ethical clearance from the Research Ethics Committee, Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro (Approval No. LUMHS/REC/416, dated 18th September 2024).

Conflict of interest: Nothing to declare

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Authors Contribution

Zahida Parveen Brohi	<i>Concept and design</i>
Uzma Parveen	<i>Acquisition of data</i>
Usama Narejo	<i>Data analysis</i>
Saba Parveen	<i>Interpretation</i>