Review Article

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Motivational Learning of Forensic Medicine through Student Projects: A Project-Based Learning Approach

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Background: Medical students often perceive Forensic Medicine & Toxicology as a secondary subject in their curriculum, leading to low levels of motivation. Project-based learning (PBL) has been recognized as an effective pedagogical tool to promote deeper engagement, self-directed learning, and long-term interest in subjects that students otherwise consider less important.

Objective: This study aimed to evaluate whether assigning short-term research projects to undergraduate MBBS students enhances motivation, interest, and self-directed learning in Forensic Medicine & Toxicology, while also assessing faculty satisfaction with the process.

Methods: A total of 101 students of the second professional MBBS batch (2013) at Himalayan Institute of Medical Sciences were divided into groups of four to five members. Twenty-six short-term research projects were designed and assigned under the guidance of cross-disciplinary faculty, with co-guidance from Forensic Medicine faculty. Ethical clearance was obtained, and sensitization sessions were conducted for both students and faculty. Data on student motivation and faculty satisfaction were collected using Likert-scale questionnaires. Statistical analysis was performed using SPSS version 18.

Results: Following project completion, 85.2% of students agreed that forensic work is complex yet interesting, compared to 45.6% who earlier believed superficial knowledge was sufficient. More than half (55.4%) reported enjoying project work, 68.4% gained additional knowledge in their research area, and 47.5% expressed increased interest in Forensic Medicine. Furthermore, 67.3% developed a greater research interest, and 90.1% felt motivated to use resources. Faculty responses were overwhelmingly positive: 88% enjoyed mentoring, 76% felt the exercise was useful at this stage, and 84% agreed that rewarding the best projects induced healthy competition.

Conclusion: Project-based learning significantly enhanced student motivation, interest, and self-directed learning in Forensic Medicine & Toxicology. Faculty satisfaction was also high, suggesting that incorporating research-oriented projects into undergraduate medical education can serve as an innovative and effective teaching method.

Keywords: Project-based, Active learning, Motivation, Teamwork, Faculty satisfaction

Introduction

Undergraduate medical education in India is often described as curriculum-heavy, examination-driven, and stress-laden. Students enter medical school with high aspirations but are quickly overwhelmed by the vastness of the syllabus and the intense pressure to secure passing grades. This environment often shapes learning into a short-term, assessment-focused endeavor rather than a pursuit of knowledge and lifelong learning. Consequently, certain subjects that are perceived as less clinically relevant, such as Forensic Medicine & Toxicology, tend to be neglected or underestimated by students.

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Forensic Medicine, taught during the MBBS course, plays a pivotal role in preparing doctors to function not only as good clinicians but also as basic medico-legal experts. It deals with issues at the interface of medicine and law, including injury analysis, postmortem examinations, toxicology, and medical jurisprudence. Despite its importance in daily medical practice, students often perceive the subject as one that can be learned superficially, mainly to clear examinations. This perception results in a lack of motivation to explore the subject in depth, which in turn limits their preparedness for real-world medico-legal responsibilities.

Educational research suggests that active learning strategies are essential to counter such disengagement. Among these, Project-Based Learning (PBL) has gained recognition as an effective approach that shifts the focus from passive reception of knowledge to active exploration. In PBL, students work in teams to investigate and solve problems, design projects, and apply their learning in practical contexts. This process fosters curiosity, critical thinking, and collaboration, while also cultivating transferable skills such as problem-solving and communication.

Earlier studies, such as those by Bartscher et al. (1995), have demonstrated that PBL significantly enhances motivation and engagement among learners, though much of this evidence has been derived from primary education and engineering contexts rather than medical education. Literature in health professions education has also shown that PBL can contribute to deeper understanding, long-term retention, and professional identity formation, but empirical evidence from Indian medical schools, particularly in the context of Forensic Medicine, remains sparse.

Against this backdrop, the Department of Forensic Medicine and Toxicology at the Himalayan Institute of Medical Sciences, Swami Rama Himalayan University, introduced short-term research projects as a PBL strategy for MBBS students. By involving students in authentic research activities under faculty guidance, the initiative sought to enhance motivation, encourage self-directed learning, and foster appreciation for the legal dimensions of medical practice. The initiative also aimed to engage faculty from other departments, thereby promoting interdisciplinary collaboration and sensitizing them to this innovative teaching-learning strategy.

This study, therefore, reports on the implementation and outcomes of project-based learning in Forensic Medicine, assessing its impact on student motivation, research orientation, and learning behaviors, while also capturing faculty perceptions of its value as a pedagogical tool.

Methods

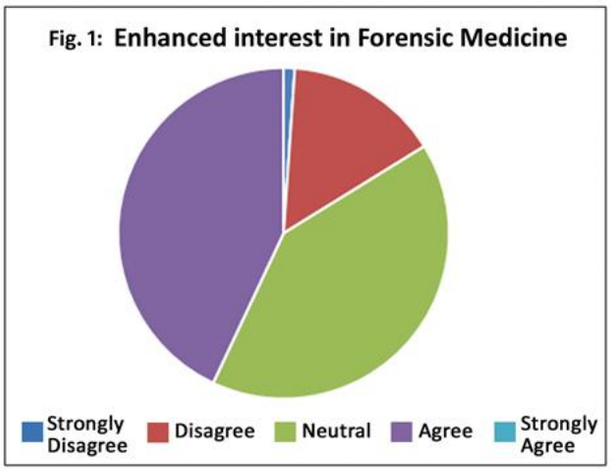
This was a cross-sectional study conducted among second professional MBBS students of Batch 2013. A total of 101 students were enrolled. Twenty-six short-term research projects were conceived. Each project was supervised by faculty from other departments with co-guidance from Forensic Medicine. Two sensitization sessions were held for students and one for faculty guides. Project proposals were submitted for IEC clearance. Data was collected using pre-designed Likert-scale questionnaires and analyzed with SPSS v18.

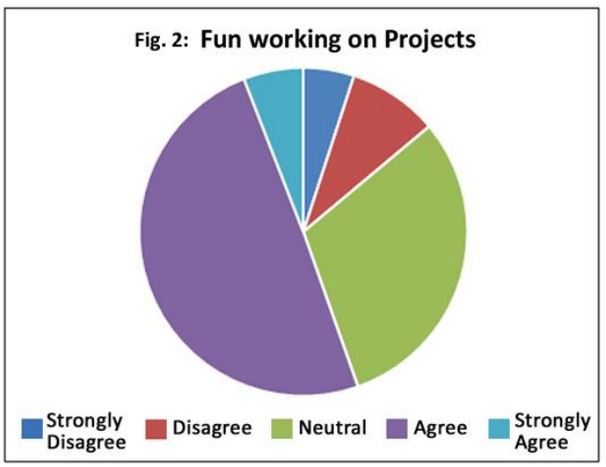
Results

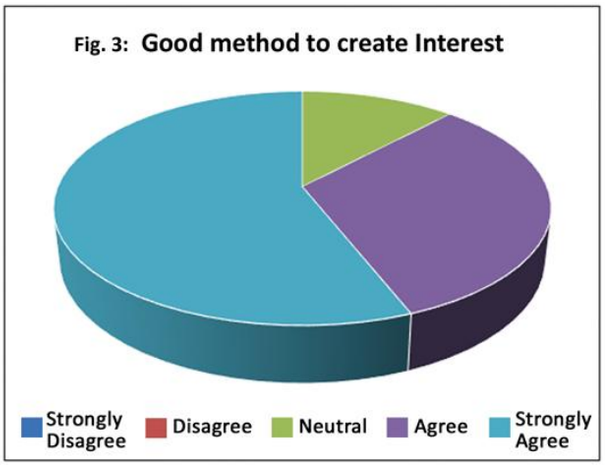
Table 1: Student Feedback (n=101)

Question	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Superficial knowledge is enough before the project	3.0	42.6	23.8	29.5	1.0
Forensic work is complex but interesting after the project				64.4	20.8
Fun to work on the project	5.0	8.9	30.7	49.5	5.9
Gained more knowledge in research area	5.0	26.5		54.5	13.9
More interest in Forensic Medicine	1.0	13.9	37.6	39.6	7.9
Interest in research increased				47.5	19.8
Would choose another project in Forensic Medicine	4.0	13.9	42.6	35.6	4.0
No motivation to use resources	24.8	65.3	5.0	5.0	
Learnt networking with teachers/peers	1.0	3.0	10.9	68.3	16.8
Team is not useful	27.7	31.7	11.9	9.9	18.8
Learnt to access and document knowledge				64.4	11.9
Will continue to use resources/network	4.0	19.8	63.4	12.9	
Motivated to revise FM during internship	2.0	6.9	46.5	36.6	7.9
Not motivated to take the FM career	2.0	34.7	52.5	7.9	3.0
Overall motivation increased	5.0	35.6	49.5	9.9	

Key findings: 85.2% found forensic work complex but interesting after project completion. 68.4% reported knowledge gain, 47.5% showed increased subject interest, and 90.1% felt motivated to use additional resources.







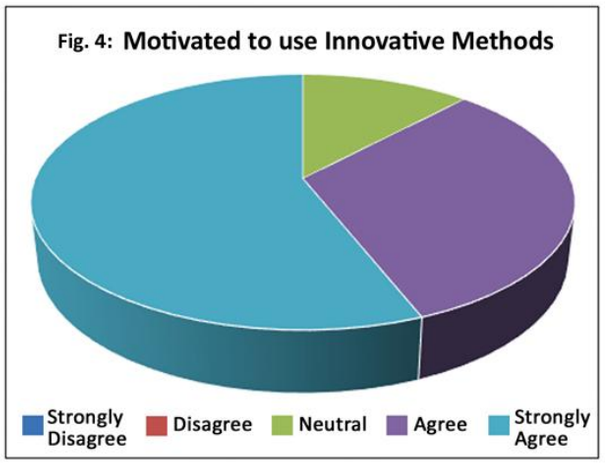


Table 2: Faculty Feedback (n=25)

Question	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)
Good idea to assign projects				20.0	80.0
Students oriented to research				40.0	56.0
Not useful at this stage (reversed)	56.0	20.0	16.0	8.0	
The topic was of interest to students	8.0	4.0	12.0	64.0	12.0
Students enjoyed the projects	4.0	4.0	20.0	44.0	28.0
Students strived to learn more	4.0	12.0	20.0	36.0	28.0
Students are more motivated at the end		8.0	20.0	44.0	28.0
Students are motivated for self-directed learning	4.0	24.0	5.0	7.9	
Faculty enjoyed being part of	4.0	8.0	32.0		56.0
Good method to create interest			12.0	32.0	56.0
Motivated to provide resources				56.0	40.0
Awarding projects induces competition		16.0		48.0	36.0
Motivated to use innovative methods			12.0	36.0	52.0

Key findings: Most faculty (88%) enjoyed mentoring projects, and 84% supported awarding the best projects. 76% believed it was useful at this stage, and 88% felt motivated to use innovative teaching methods.

Discussion

Student-Centric Gains

The project work stimulated **self-directed learning;** a skill essential for lifelong professional growth. The findings suggest that students not only acquired factual knowledge but also developed the ability to navigate various academic resources, including books, journals, museums, and online databases. This is significant in the Indian context, where traditional teaching often prioritizes rote memorization over critical thinking and inquiry. By engaging in **hands-on projects**, students gained ownership of their learning and began to view themselves as active participants in the academic process rather than passive recipients of information.

The emphasis on **teamwork** and peer-to-peer collaboration also cultivated soft skills, including communication, conflict resolution, and shared responsibility. These are indispensable for modern healthcare practice, where multidisciplinary collaboration is the norm. Importantly, nearly two-thirds of the students reported enhanced interest in **research**,

pointing to the potential of PBL in nurturing the next generation of clinician-researchers. This aligns with the National Medical Commission's (NMC) increasing emphasis on research orientation in undergraduate curricula.

Faculty-Centric Gains

From the faculty perspective, the results underscore the dual benefit of PBL. Not only did students benefit, but **faculty members themselves reported renewed enthusiasm** for teaching. The involvement of faculty from diverse disciplines expanded the pedagogical horizon and fostered **interdisciplinary collaboration.** Faculty expressed motivation to incorporate innovative methodologies into their routine teaching, suggesting a ripple effect that extends beyond the scope of this study.

The use of external evaluators and awarding of the best projects provided a competitive yet constructive academic environment, encouraging excellence and recognition. Such recognition mechanisms are known to strengthen student morale and validate faculty efforts, creating a sustainable cycle of motivation.

Alignment with Broader Educational Literature

The findings resonate with evidence from engineering, primary education, and health sciences, where PBL has been consistently associated with **deeper conceptual understanding, intrinsic motivation, and long-term retention of knowledge.** However, its application in medical education, especially in **Forensic Medicine,** remains underexplored. By providing evidence in this domain, the present study fills an important gap and reinforces calls for diversification of pedagogical methods in Indian medical colleges.

Challenges and Limitations

Despite these encouraging outcomes, challenges remain. The timing of the projects coincided with formative assessments, generating additional pressure for students. Furthermore, differences in faculty engagement created variability in student enthusiasm, underlining the need for **systematic faculty development programs** to ensure uniform quality of mentorship. Resource limitations, including access to advanced research tools and databases, also restrict the scalability of such initiatives.

Implications for Future Practice

The study suggests that embedding PBL within the second-year Forensic Medicine curriculum can significantly **reframe student attitudes** towards the discipline. Beyond Forensic Medicine, this approach can be adapted to other subjects that suffer from low student interest, such as Community Medicine or Biochemistry. Future studies should explore **longitudinal outcomes**, including whether early exposure to PBL influences students' clinical reasoning, performance in medico-legal practice, and long-term interest in academic medicine.

Moreover, structured **faculty development workshops** can be designed to empower more teachers to guide research projects with confidence. Establishing institutional support in terms of timelines, dedicated research hours, and resources will ensure sustainability and reduce stress among students and faculty.

Conclusion

Project-based learning through short-term research projects increased motivation, research orientation, and self-directed learning among MBBS students in Forensic Medicine & Toxicology. It also enhanced faculty satisfaction and promoted interdisciplinary collaboration.

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