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* **Corresponding author.**

harishreddy1349@gmail.com

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Snippets of Student Centric Methods for Postgraduate Teaching

Shashidhar K N¹, Rangareddy Harish^{2*}, Prabhavathi K³

1 Professor and HoD, Department of Biochemistry, Sri Devaraj Urs Medical College, Tamaka, Kolar, 563103, Karnataka, India

2 Assistant Professor, Department of Biochemistry, Haveri Institute of Medical Sciences, Haveri, 581110, Karnataka, India

3 Professor, Department of Biochemistry, Sri Devaraj Urs Medical College, Tamaka, Kolar, 563103, Karnataka, India

Abstract

The field of medical education has witnessed a transition from traditional teaching methods to competency-based medical education, with an increasing focus on student-centered learning. This study aims to provide additional evidence supporting the effectiveness of student-centric approaches in medical education. The main objectives of this study are to assess the implementation of student-centered methods for second-year pathology postgraduate students and to evaluate the outcomes in terms of feedback and performance. In the Department of Biochemistry, several student-centered methods, including experiential learning, flipped classroom, student-led seminars, and a constructivist learning model, were employed for the assigned second-year pathology postgraduate students. Following a 15-day posting period, feedback was collected from the students, and their performance was assessed through graded examinations. Feedback from the participating postgraduate students was obtained, and their performance in the end-of-posting exams was analyzed. The results indicated positive student outcomes, with all students passing the exams. Self-perceived increased critical thinking and reasoning skills were reported during focus group discussion. The findings of this study support the effectiveness of student-centered approaches in medical education. The successful implementation of various student-centered methods for second-year pathology postgraduate students highlights the importance of incorporating learner-centric strategies. These results emphasize the need for faculty development at all levels to facilitate the adoption of student-centered teaching methods in medical education.

Keywords: Competency based education; Postgraduate medical education

Introduction

In India, medical education as a whole has experienced a paradigm shift from traditional teaching to the current competency-based medical education, where the prominent theme is student-centered learning.¹ This competency-based curriculum equips, prepares, and produces Indian Medical Graduates capable of success.¹ Postgraduate medical education typically follows a structured curriculum and training program.² However, there is a growing recognition of the need to incorporate student-centric methods, including competency-based medical education (CBME), to enhance the learning experiences and outcomes of postgraduate medical students.² This study explores the student centric methods for postgraduate teaching-learning-evaluation and provides further evidence in favor of competency based medical education.

Materials and methods

- **Study design:** Inductive Qualitative study based conventional feedback analysis.
- **Universal sampling:** All 2nd year Pathology junior residents posted in the department of Biochemistry during the Academic year 2021-22 as part of their external postings were included in the study.
- **Sample size:** All junior residents attended the postings for a duration of 15days (n=4).

The methodology behind the four student-centric methods of postgraduate teaching employed:

Experiential Learning

- In this method, postgraduate students actively engage in practical activities, such as case studies, simulations, role-playing, or real-world experiences. They then reflect on these experiences to extract meaningful insights and connect theory with practice.³ Practice based

learning was implemented where the postgraduates were sent to the laboratory and asked to collect a few reports related to patient as a part of a case study. Later the reports were interpreted and correlated with the clinical diagnosis. The cases discussed included chronic kidney disease, myocardial infarction and liver cirrhosis.

Flipped classroom

- The flipped classroom model reverses the traditional approach to learning. In this method, postgraduate students are assigned learning materials, such as recorded lectures or readings, to review before attending class. Classroom time is then utilized for interactive discussions, collaborative activities, and practical application of knowledge. The instructor serves as a facilitator, providing guidance and addressing student questions and challenges.⁴
- The topic specific learning objectives for Organ Function Tests were outlined and the postgraduate students were asked to prepare for the class in advance. This was followed by short lecture on the topics by faculty.
- Active learning was encouraged by allowing the students to apply concepts in class where they could ask faculty for clarification which could tie the discussion to the topic.

Student led Seminar

The student-led seminar is an approach where postgraduate students take an active role in designing, organizing, and leading seminars or group discussions. Each student is responsible for selecting a topic, conducting relevant research, and preparing a presentation or discussion materials. During the seminar, students present their findings and facilitate discussions among their peers.⁵ This method encourages student autonomy, research skills, and critical thinking.

It also provides an opportunity for postgraduate students to develop presentation and communication skills while exploring topics of interest in depth.

- The postgraduate students were allotted seminar topics on urinalysis and instrumentation for presentation.
- This exercise was to develop competencies through information retrieval, identifying reliable resources, organizing information and communicating effectively to peers using suitable ICT tools (PowerPoint presentation).
- It also fosters team work skills.

Constructivist Learning Model (5-E learning cycle)

- In this learning model “5 E” were used Engage, Explore, Explain, Elaborate and Evaluate.⁶
- This involved initiating the students to the new knowledge through short lecture (Engage) followed by an exercise for the postgraduate students to prepare consensus answers to questions (Explore).
- These consensus answers were presented in a small group discussion (Explain) and submitted to faculty. The gaps were elaborated by the faculty to tie the discussion with the topic (Elaborate).
- A final evaluation occurred at the end of the postings (Evaluate).

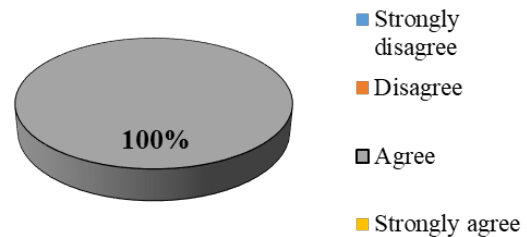
End posting examination was conducted for the postgraduates to evaluate the effectiveness of the student centric methods. Feedback was obtained from the postgraduates on the student centric methods.

Results

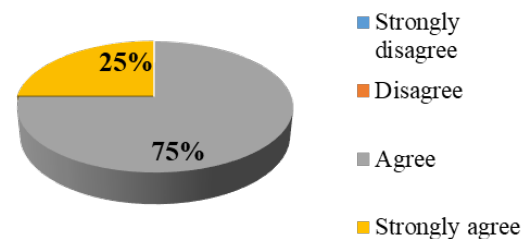
The four pathology junior residents posted for duration of 15 days attended the external postings in Department of Biochemistry which is mandated for their partial fulfillment of the MD Pathology program. The residents were subjected to four different student centric teaching methods. At the end of the postings evaluation was done by formative assessment. The results tabulated and submitted to the Department of Pathology. The resident logbooks were evaluated. The feedback was obtained from the residents.

The feedback form questionnaire with the responses was as follows:

1. The teaching learning methods adopted by Department of Biochemistry helped me understand the topics better.



2. Feel that I have successfully achieved the learning outcomes during Biochemistry postings.



3. What was the most challenging part of this posting in terms of planning and preparation?

- “Understanding the working principles of various instruments”.
- “Interpreting of results from clinical cases & clinical correlation with laboratory parameters”.

4. Any other suggestions/comments for improvement-

- “Include Multiple Choice Questions for assessment”.

During a focus group discussion, residents who were undergoing training expressed a strong inclination towards interactive and case-based learning methods. They emphasized their desire for hands-on experiences that involved practical scenarios and real patient cases. Additionally, they raised concerns regarding the amount of time needed for adequate preparation to fully engage in such learning approaches. Overall, the postgraduates highlighted the importance of incorporating real-life patient cases into their training to enhance their learning experience. With regards to the end postings assessment the postgraduates expressed inclusion of multiple choice questions (MCQs) stating that MCQs can enhance students’ competencies by promoting comprehensive knowledge acquisition, critical thinking, standardization, efficient feedback, time management skills, exam preparation, and curriculum refinement.

Discussion

In this study, student-centered teaching methods are defined as those other than conventional lectures and include various instructional strategies for promoting active student learning. Student-centric methods in postgraduate medical education can involve incorporating active learning strategies, such

as case-based discussions, problem-solving exercises, small group discussions and simulation-based training.⁷ The student centric methods employed in our study are discussed below.

Experiential learning

In a study by Suter B *et al.*, first year medical students were educated on the process of connecting pertinent biochemical mechanisms, histological observations, and anatomical characteristics with clinical indications and manifestations. This enabled them to effectively diagnose conditions and propose appropriate courses of treatment for cervical adenocarcinoma.⁸ In a study by Flowers M *et al.*, students completed the Self-Assessment of Clinical Reflection and Reasoning, Physical Therapy Self-Efficacy Scale, and Health Science Reasoning Test during the first and last weeks of the semester which demonstrated significant increase in self-perceived clinical reasoning and self-efficacy among those who received high dose experiential learning compared to low dose experiential learning.⁹

In our study the Pathology residents conveyed that experiential learning by analyzing laboratory data of the cases; fostered critical thinking and problem-solving abilities as they analyzed complex data, consider differential diagnoses, and make informed decisions.

Experiential learning empowers pathology residents to develop diagnostic skills by directly observing and analyzing histopathological changes fostering the ability to differentiate these conditions and recognize characteristic features, and enhancing their capacity to correlate histopathological findings with clinical presentations.

Flipped Classroom

By flipping the traditional learning model, in which students passively receive information during lectures and then complete assignments at resident hostel, pathology residents can actively engage with the material, collaborate with peers, and apply their knowledge in a practical context.

In a study by Maness HTD *et al.*, the department of pathology at the University of Florida developed and implemented a training program to address the needs of current students, faculty, and staff in the upcoming field of pathology informatics. The program consisted of three one-credit courses designed with a flipped classroom approach. To evaluate the program's effectiveness, a unique survey instrument was used to assess each course, and follow-up interviews were conducted with six participants six months after completing the program. The courses successfully achieved their objectives, although there is room for improvement. Key factors that positively influenced the program included collaborative learning and the inclusion of real-world practice problems. The program also resulted

in improved communication with informatics colleagues and enhanced job task efficiency and effectiveness.¹⁰

Similarly, in our study the flipped classroom approach for studying organ function tests offered pathology residents several benefits. It promoted active learning through pre-class activities and individual pacing, allowing residents to engage deeply with the material. In-class time was dedicated to interactive discussions, collaborative activities, and practical exercises that enhance critical thinking and real-world application. Residents received immediate feedback, benefitted from multidisciplinary perspectives, and had continued access to learning resources in the Department and Central library. The flipped classroom approach maximized residents' understanding, retention, and practical skills related to organ function tests.

Student led Seminar

In a study by Vij V *et al.*, an active-learning strategy called Student-Led Seminar Series (SLSS) was implemented as a substitute for passive learning in traditional tutorial classes in the subject of physiology. Over a 4-month period, the effectiveness of the SLSS program was evaluated and statistically significant improvement in student satisfaction and self-perceived increase in knowledge, skills and attitude was reported.¹¹

In our study, Pathology residents benefited from student-led seminars focused on urinalysis and instrumentation of colorimeters, spectrophotometers, and high-performance liquid chromatography (HPLC). Firstly, taking the lead in preparing and delivering seminars enhanced their understanding of the subject matter as they delved into the details, critically analyzed concepts to synthesize knowledge. Secondly, these seminars fostered peer learning and collaboration, allowing residents to share expertise, exchange ideas, and broaden their understanding through discussions and interactions with their peers. Additionally, leading seminars helped residents develop communication and presentation skills, which are vital for effective communication in their future pathology practice. Practical application of knowledge was also emphasized through hands-on examination in the central diagnostic laboratory, enabling residents to confidently and accurately interpret the investigations. Lastly, the "learning by teaching" effect ensures long-term retention of knowledge as residents reinforce their understanding, organize information, and enhance their retention through actively teaching others during the seminars.

Constructivist learning model (5-E learning cycle)

The constructivist learning model known as the "5 E" model, which consists of the stages Engage, Explore, Explain, Elaborate, and Evaluate, aligns well with the principles

of constructivism and provides a framework for effective learning experiences.⁶

Jensen JL et al conducted a study using a quasi-experimental design to compare the effectiveness of an active non-flipped classroom and an active flipped classroom, both employing the 5-E learning cycle. The aim was to isolate the role of the instructor as the main variable while controlling for other potentially influential factors. The results indicated that both conditions yielded similar outcomes in terms of low-level and deep conceptual learning. Furthermore, attitudinal data showed that students expressed equal satisfaction with the course in both settings. Interestingly, both groups ranked their contact time with the instructor as more influential to their learning than the activities they performed at home.¹²

In our study each stage of the 5 E model was adapted to enhance the pathology postgraduates learning experiences:

- Engage: Residents' attention was captured with clinical cases, encouraging their initial thoughts and observations.
- Explore: Hands-on activities were provided viz., analyzing laboratory data, to deepen understanding.
- Explain: Small group discussions were carried out with peer interactions to clarify misconceptions and promote articulation of ideas.
- Elaborate: Residents presented cases that required critical thinking and application of knowledge to real-life scenarios.
- Evaluate: Residents' learning outcomes were assessed through presentations, formative assessment and constructive feedback was provided individually.

In India, Postgraduate medical education programs have embraced a competency-based curriculum that outlines required skills, with competency-based assessments involving active self-assessment, peer assessment, and feedback processes, aligning with defined competencies and enabling learners to showcase their skills in real clinical contexts.^{13,14}

Postgraduate students can benefit from mentorship and coaching, where experienced faculty or clinicians can guide and support their learning journey.¹⁵ Mentors or coaches can provide feedback, career guidance, and support for professional development.¹⁶

Learners can be encouraged to reflect on their learning experiences and provide feedback on the curriculum, teaching methods, and assessments. This feedback can help educators to refine the curriculum, teaching strategies, and assessments to better meet the needs of learners.¹⁷ Student-centered learning (SCL) prioritizes the role of the student in shaping educational policies, practices, and decision-making. SCL recognizes the importance of involving students in meaningful ways, empowering them to take ownership of their learning journey and fostering a collaborative and

engaging educational environment.¹⁸

Limitations of the study

A small sample size may result in limited variation in responses, limiting the depth and breadth of the data collected. In qualitative research, data saturation, the point at which no new information or themes emerge from the data, may be more challenging to achieve with a small sample size. The limited number of participants may not provide enough diverse perspectives and experiences to reach data saturation. However, the homogeneity of the study group and focused research objectives facilitate the extrapolation of findings to other studies.

Conclusion

The move to learner centered strategies has major implications for faculty development at all levels from the institutional to the individual. Overall, student-centric methods in CBME prioritize the active engagement, autonomy, and reflection of learners in the learning process. By empowering learners to take ownership of their education, personalized their learning, and actively participate in assessment and feedback, student-centric CBME can enhance learner motivation, engagement, and the acquisition of competencies or skills necessary for medical practice. Student-centric methods of postgraduate teaching prioritize active engagement, reflection, collaboration, and the integration of theory and practice. They aim to enhance the learning experiences, promote higher-order thinking, and prepare postgraduate students for real-world challenges in their respective fields.

Ethical considerations

This study was conducted based on the principles of the Declaration of Helsinki. Before the study, the approval of the Institutional Ethics Committee of Sri Devaraj Urs Medical College (No.DMC/KLR/IEC/440/2021-22) was obtained.

Authors' contributions

All the authors participated in the process of the initial writing of the manuscript, its revision, presentation of the idea and initial design, and collection and analysis of data. Moreover, all authors accept the responsibility for the accuracy and correctness of the contents of the present manuscript and approve the final version of the manuscript.

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