

An Insight into The Perceptions of Biochemistry Teachers Regarding Innovative Teaching Methodologies Employed in Integrated Medical Curriculum

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ABSTRACT

Objective: The objective of the study was to analyze perceptions of medical teachers on newer methodologies used in teaching biochemistry in the integrated medical curriculum

Study design: Cross sectional study observational study.

Settings: The department of Biochemistry, University Medical & Dental College Faisalabad.

Duration: 15th January, 2025 to 15th June, 2025

Methods: The ethical approval was obtained from Ethical review committee of The University of Faisalabad, 52 faculty members from Biochemistry departments of various medical colleges across Pakistan participated in the study. Informed consent was taken; data was collected from participants using a structured questionnaire followed by statistical analysis using IBM SPSS software.

Results: Most medical teachers were satisfied with the modern interactive teaching methods. The practice most liked was Case-based learning (44,84.6% teachers), followed by small group discussions (42,80.7%) and then, large group interactive sessions (40,76.9%). However, only 32(61%) teachers supported the flipped classroom method. A statistically significant association was found between teachers' satisfaction levels and different teaching methodologies when analyzed using the Pearson Chi-square test.

Conclusion: Biochemistry teachers accepted the innovative teaching methodologies as these are useful in promoting student centered teaching, engagement and improving the outcomes of teaching in integrated medical curriculum. Broader faculty adoption of these strategies may enhance teaching quality and learning outcomes..

Keywords: Faculty perception, Biochemistry, innovative teaching methodologies...

INTRODUCTION

There has been an increasing emphasis on integrated curriculum which utilizes innovative teaching methods including problem-based learning, case-based learning, flipped classrooms and even large group interactive sessions. Also, there has been significant criticism on traditional disciplinary teaching methods for promoting rote memorization instead of conceptual understanding and clinical application. The use of innovative teaching methodologies is thought to improve student engagement, ensure vertical, horizontal and spiral integration and produce a more skillful and competent clinician.1...

Biochemistry, one of the basic science subjects has a fundamental role in understanding both health and disease. The medical students learning biochemistry in the traditional didactic way complain about being less engaged and cognitively overloaded.² The novel learner centered strategies and early clinical exposure in the integrated medical curriculum will complement each other in improving the relevance of basic sciences with the health and disease and will promote critical thinking and life-long learning. However, the successful implantation of these methods depends on acceptance and effectiveness of teachers.³

Perceptions of teachers must be analyzed for proper and sustainable adoption of educational reforms. Biochemistry being conceptually complex poses unique challenges for learners emphasizing a deeper and clearer insight of teachers' perspective. Despite the global transformation toward integrated medical education, limited research has been carried out to explore teachers' perception of innovative teaching strategies particularly in Pakistan.⁴

Material and METHODS

This questionnaire based observational study was conducted at UMDC, Faisalabad after obtaining ethical approval by the Ethical Review Committee of the University of Faisalabad (Ref: TUF/IRB/06/25 dated 13.01.2025). The study was conducted in a time frame of 6 months (15th January, 2025 to 15th June, 2025) engaging 52 biochemistry teachers ranging from professors to demonstrators from miscellaneous national and international institutes. The participants were chosen by purposive selection method. All participants gave informed consent, and participant anonymity was ensured. A well-structured questionnaire was made and validated by Delphi technique. 5 points Likert scale ranging from strongly disagree (SD)= -2, disagree (D)= -1, neutral (N)= 0, agree (A)=+1, and strongly agree (SA)=+2 was adopted to establish the level of agreement. Association between the overall level of satisfaction of teachers with integrated curriculum and level of satisfaction with large group interactive sessions, small group discussions, case-based learning and flipped classroom was established employing IBM SPSS software.

RESULTS

The results were collected using Google forms. The frequency and percentage were calculated. Analyzing the perceptions of teachers regarding the large group interactive sessions on Likert scale showed that 40(77%) of the 52 teachers agreed and only 7(13.5%) disagreed to this learning strategy. Considering small group discussions 42(80%) facilitators agreed to this teaching method as it promotes a student-centered learning environment. Still a higher number 44(85%) of teachers found case based learning an effective way of teaching biochemistry. However, the flipped classroom method was agreed upon by lesser number of teachers 31(60%) of biochemistry teachers.

Questions	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
Do the large group interactive sessions in Biochemistry help in improvement of knowledge?	11(21.2%)	29(55.8%)	5(9.6%)	6(11.5%)	1(1.9%)
Do the SGD in Biochemistry promote student centered approach?	14(26.9%)	28(53.8%)	4(7.7%)	3(5.8%)	3(5.8%)
Have you found Case based learning in Biochemistry challenging and thought provoking?	10(19.2%)	34(65.4%)	5(9.6%)	1(1.9%)	2(3.8%)
Do you think that flipped classroom in Biochemistry introduced in integrated modular curriculum is a useful innovation?	5(9.6%)	26(50%)	15(28.8%)	3(5.8%)	3(5.8%)

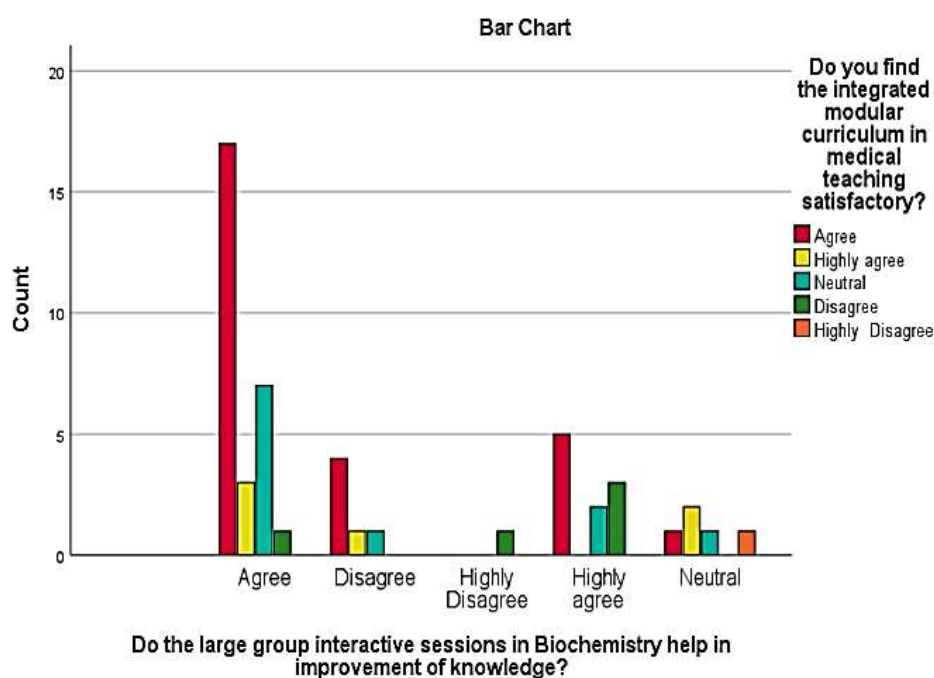
Each of these teaching methodologies were compared statistically with the overall level of satisfaction with integrated modular curriculum 2k23 launched by UHS, Lahore. Pearson chi square analysis on IBM SPSS was done and the results were significant for each comparison.

Do the large group interactive sessions in Biochemistry help in improvement of knowledge? Do you find the integrated modular curriculum in medical teaching satisfactory?

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	83.806 ^a	25	.000
Likelihood Ratio	39.067	25	.036
N of Valid Cases	52		

Graph 1:

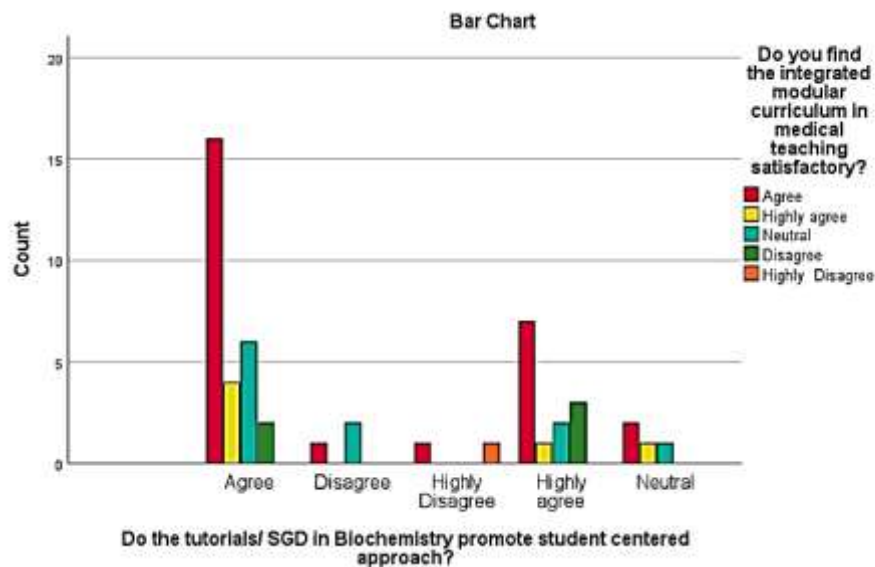


Do the tutorials/ SGD in Biochemistry promote student centered approach? * Do you find the integrated modular curriculum in medical teaching satisfactory?

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	85.887 ^a	25	.000
Likelihood Ratio	32.325	25	.149
N of Valid Cases	52		

Graph 2:

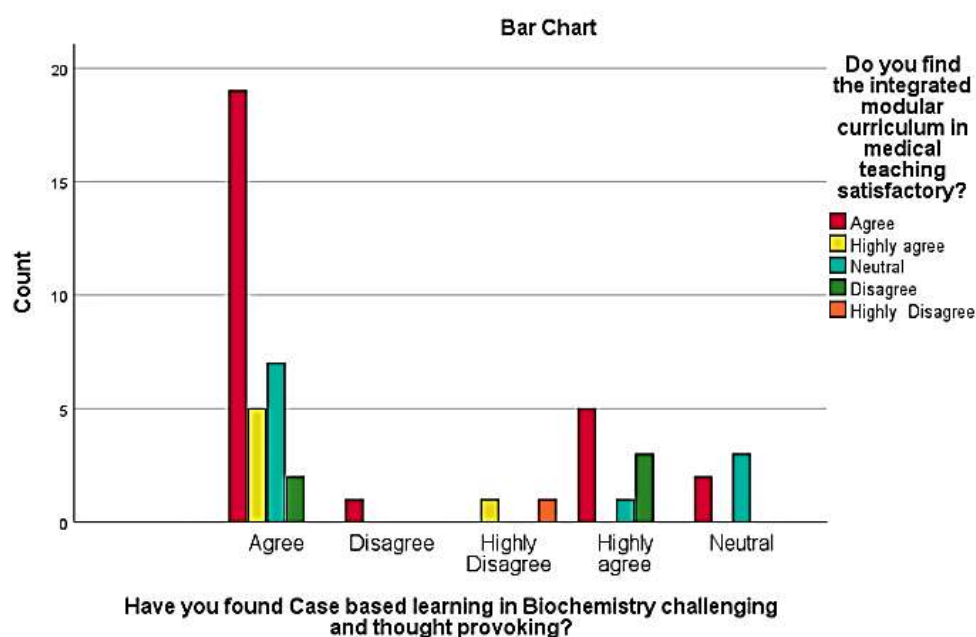


Have you found Case based learning in Biochemistry challenging and thought provoking? * Do you find the integrated modular curriculum in medical teaching satisfactory?

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	94.498 ^a	25	.000
Likelihood Ratio	40.695	25	.025
N of Valid Cases	52		

Graph 3:

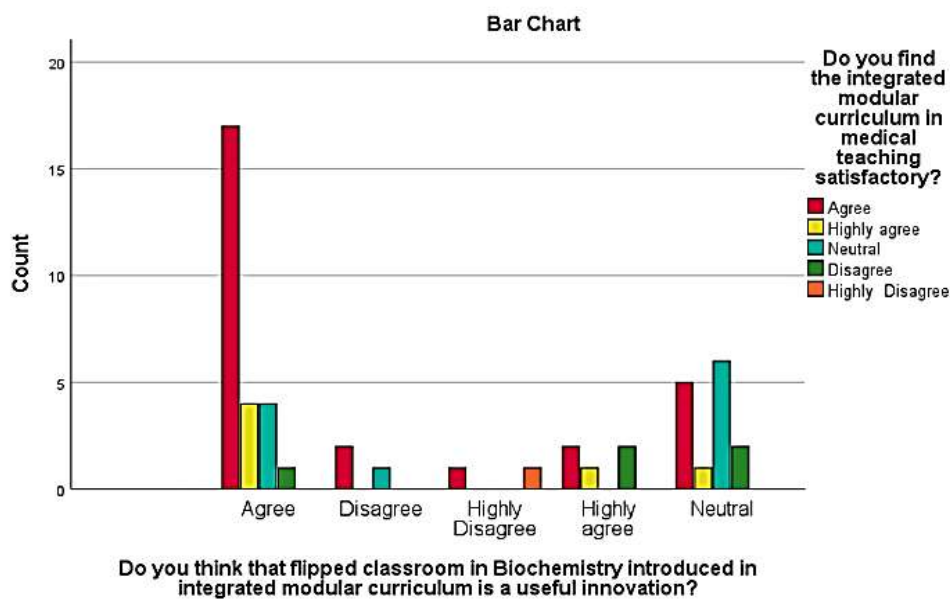


Do you think that flipped classroom in Biochemistry introduced in integrated modular curriculum is a useful innovation? * Do you find the integrated modular curriculum in medical teaching satisfactory?

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	91.936 ^a	25	.000
Likelihood Ratio	38.255	25	.044
N of Valid Cases	52		

Graph 4:



DISCUSSION

The traditional medical education strategies had some shortcomings which made it insufficient to cope with the dynamic and rapidly growing field of medicine. The present competency based integrated medical curriculum promotes self-directed learning and this provides the opportunity to produce life-long learners. Various novel strategies are involved in this commensurate medical curriculum. In view of these progressions, it is necessary to evaluate the perceptions of teachers involved in teaching the preclinical medical sciences.⁵

In a study done by Zulfiqar et al, in 2023 it was proved that large group interactive lecture is more favored by the students and has improved their performance in the tests as compared to conventional lectures.⁶

Badge et al published a review article in 2024 highlighting the pros and cons of small group discussions in medical education along with the solutions to the related problems. Nevertheless, the advantages of SGD completely outweigh the challenges. The advantages of SGD according to this review include increased students' confidence and competency, enhanced evidence base clinical practice, encouragement of research culture updating practices and professional growth. The challenges of SGD include faculty training and preparedness, adequate resources and futuristic technology.⁷ Darmayani (2024) wrote a similar review article and concluded that small group discussions are helpful in improving critical thinking process and have a profound positive effect on the learning outcomes and test scores of medical students.⁸

Framke et al (2022) quoted that the change of medical education from traditional lectures to interactive learning methodologies is a must for better engagement of Generation Z learners, and undergraduate medical curricula must adapt suitably. Case-based learning provides an effectual and productive strategy to involve undergraduate medical students despite limitation of resources faced by educators.⁹ Taskmaster (2023) performed a meta-analysis to compare the efficacy of case-based learning versus the traditional learning methods. He concluded that employing case based learning in medical teaching

has improved the academic performance of students as well as increase in depth understanding.¹⁰

Spaic et al (2025) carried out a meta-analysis on 141 studies. In most of these studies, either observational or randomized control trials, better outcomes were reported while using flipped classroom technique as compared to traditional teaching methods. 5842 participants of these studies described that students are satisfied with flipped classrooms as this allows adequate time for understanding and problem solving during traditional classes.¹¹ Nichat et al (2023) discussed the strengths and weaknesses of the FC approach. The strengths include self-preparation, participation and improved critical thinking. The weaknesses may include some technical issues, improper planning, lack of self-motivation, improper faculty development.¹²

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