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Faculty and learner's perception on Benefits and Challenges of Integrated Modular Biochemistry Curriculum

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ABSTRACT

Objective: The objective of this study was to assess the perceptions of students and faculty regarding the transition from a traditional to an integrated medical curriculum, with a particular emphasis on its impact on the teaching and learning of biochemistry.

Study design: Cross sectional study

Settings: Department of Biochemistry, University Medical & Dental College Faisalabad

Duration: From15th January, 2025 to 15th March, 2025

Methods: Ethical approval was obtained from the review committee of The University of Faisalabad. The study included 300 first- and second-year female MBBS students and 52 biochemistry faculty members. Sample size was calculated using the WHO calculator, and participants were selected through simple random sampling. Informed consent was taken, and data was collected via a validated questionnaire (Google Forms) and analyzed using descriptive statistics in SPSS

Results: Both students and teachers reported overall positive perceptions of the integrated biochemistry curriculum, with the strongest agreement on its role in connecting basic and clinical sciences. OSVE was viewed favorably as an assessment tool, while students were more satisfied with integrated assessments than teachers. Key challenges included content overload and difficulty in achieving subject integration. All findings were statistically significant ($p < 0.05$). Most students agreed that integrated biochemistry improved concept retention, aligned practicals with theory, and supported peer interaction, though many reported insufficient time for revision and increased cognitive load.

Conclusion: The integrated biochemistry curriculum was generally perceived positively by both students and faculty, especially for strengthening the connection between basic and clinical sciences and enhancing research and communication skills. Nevertheless, challenges related to content overload, cognitive burden, and limited revision time highlight the need for refinement. Future curriculum planning should address these issues to maximize the benefits of integration

Keyword: Biochemistry, Integrated Modular Curriculum, Undergraduate Medical Students, Teachers

1. INTRODUCTION

There is a global trend of replacing the traditional teaching in medical schools with integrated curriculum in the past decade.[1] The basic and clinical sciences have been inter weaned in the modern day integrated modular curricula to create an interdisciplinary curriculum. The objective of this evolution is to enhance the learning, teaching and clinical applications in medical education while simultaneously decreasing the unnecessary details and frequent repetitions.[2] In the traditional teacher-centered medical education system, subjects were taught in isolation, making it difficult for students to integrate basic sciences with clinical subjects. The newer integrated approach shifts the teacher's role to a facilitator, removes rigid subject boundaries, and promotes deeper understanding with stronger clinical correlation across the five years of training.[3]

Human body is a hub of complex interactions of numerous biochemical pathways which play a central role in both health and disease. Biochemistry, being the study of these biochemical processes, has a fundamental position when it comes to the understanding of the normal body functions or to analyze the diseases related to them. As quoted by Kadavakollu S et al.[4] it is a volatile subject with relatively higher difficulty index. A common question for many biochemistry teachers is how to best integrate clinical biochemistry into an integrated curriculum keeping in view its contributions to the fields of cell biology and physiology, pharmacology, toxicology, immunology, microbiology, cell injury and cancer, as well as the fields of epidemiology.

The University of Health Sciences, Lahore, introduced Curriculum 2k23 across Punjab medical colleges, integrating biochemistry spirally with other subjects to promote cohesive understanding and clinical application through scenario-based learning.[5] The curriculum aims to produce a seven-star doctor by promoting a student-centered approach in medical school and patient-centered care thereafter. Developed collaboratively by all departments, it incorporates spiral integration and revised assessments. This shift has significantly impacted faculty, creating a greater need for resources and training through workshops to support effective implementation.[6] This relatively novel approach provoked the need for a study to inquire a student and teacher feedback so that we can assess the impact of this curriculum on these major stakeholders of medical education

2. MATERIAL AND METHODS:

A cross sectional study was conducted at University Medical and Dental College Faisalabad, a constituent college of The University of Faisalabad. Ethical approval Ref: TUF/IRB/06/25 dated 13.01.2025 was taken from ethical review committee of The University of Faisalabad. The study included 300 students of first year MBBS and second year MBBS studying under modular integrated curriculum 2k23. Exclusion criteria were students of MBBS studying under traditional curriculum.

A total of 52 faculty members from multicentric Biochemistry departments were engaged. The faculty members included demonstrators to professors. Identity, designation and institute of faculty members were not disclosed .This study was conducted from 15th January, 2025 to 15th March, 2025. Sample size was calculated using WHO sample size calculator. Random sampling technique was employed. Informed consent from all participants of study was taken. This cross-sectional study employed a well-structured, reliable, and Dolphi technique validated questionnaire to assess the integrated medical curriculum, as perceived by students and faculty. Likert scale was used to access the level of agreement on 5-point scale ranging from strongly disagree (SD)= -2, disagree (D)= -1, neutral (N)= 0, agree (A)=+1, and strongly agree (SA)=+2. Quantitative data was analyzed using descriptive statistics using IBM SPSS software.

3. RESULTS:

Questionnaire was disseminated to students and teachers via google forms and responses were collected. It was anticipated that out of 52 teachers, 28(53.8 %) were satisfied with the integrated modular curriculum, while among the students 153(51%) of the 300 students were satisfied. Chi square test was used to compare the level of satisfaction in teachers and students. The results were found to be statically significant with a p-value of less than 0.05

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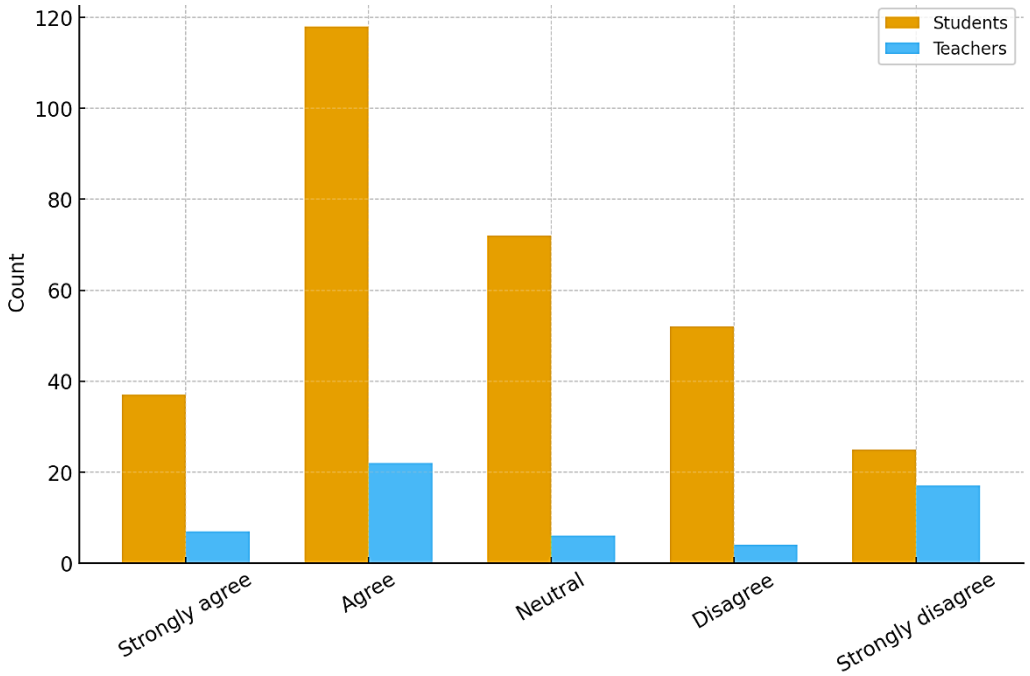
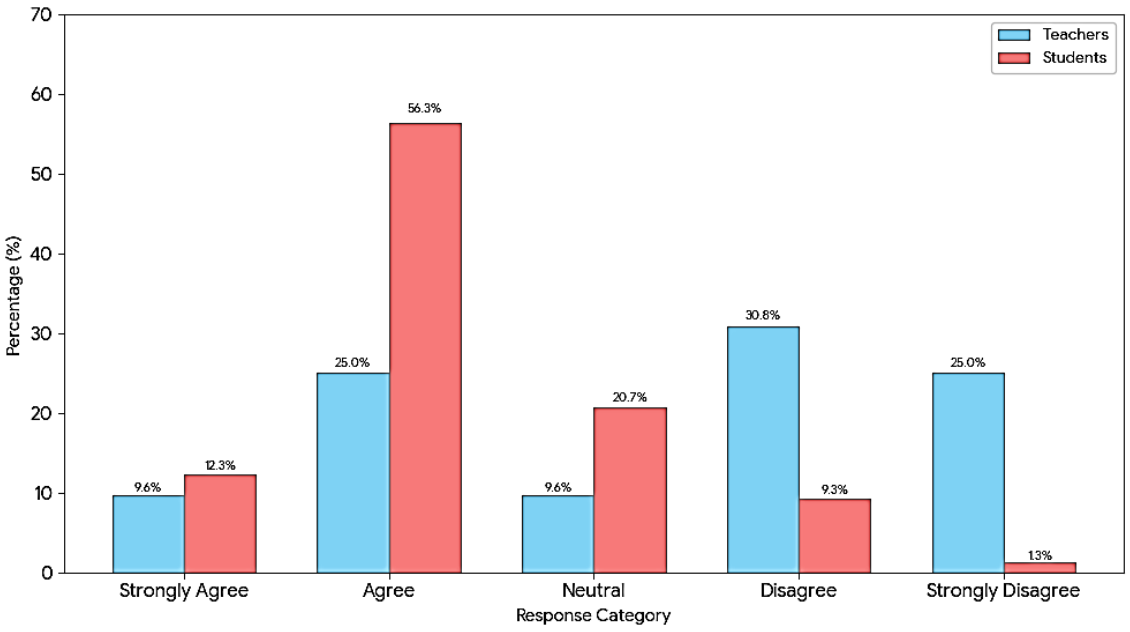
Figure1: Satisfaction with integrated modular curriculum



Considering the relevance of biochemistry with other clinical aspects a large proportion of students (222,74%) as well as teachers (45,86.5%) were satisfied. Similarly, 206(68.6%) of students and 18(34.6%) of the teachers were satisfied with the assessment policy of the novel curriculum. Chi square analysis gave significant relationship between the two variables regarding both these parameters. When both the communities were asked about the novel assessment tool OSVE, 33 (63%) teachers agreed to this innovation and 206(69%) students agreed, showing a significant relationship.

Figure 2: Assessment in integrated modular curriculum



Similar comparative analysis was done regarding the development of research culture, communication skills, integration with other subjects and difficulties in time management and all the results were statistically significant as given in table 1

Table 1: Responses of Students and Faculty on the Integrated Medical Curriculum

Item	Target	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)	Chi square test significance
Do you find the integrated modular curriculum in medical teaching satisfactory?	Teachers	6(11.5%)	22(42.3%)	1(1.9%)	5(9.6%)	18(34.6 %)	0.000
	Students	36(12.0 %)	117(39.0 %)	71(23.7 %)	53(17.7 %)	23(7.7%)	
Do you think the integrated modular curriculum has helped connect Biochemistry with clinical subjects?	Teachers	17(32.7 %)	28(53.8%)	4(7.7%)	2(3.8%)	1(1.9%)	0.000
	Students	55(18.3 %)	167(55.7 %)	56(18.7 %)	19(6.3%)	3(1.0%)	
Do the assessments in Biochemistry reflect the integrated approach to learning?	Teachers	5(9.6%)	13(25.0%)	5(9.6%)	16(30.8 %)	13(25.0 %)	0.001
	Students	37(12.3 %)	169(56.3)	62(20.7 %)	28(9.3%)	4(1.3%)	
Are you satisfied with OSVE as an assessment tool in Biochemistry in the integrated modular curriculum?	Teachers	6(11.5%)	27(51.9%)	9(17.3%)	6(19.2%)	4(1.9%)	0.000
	Students	51(17.05 %)	155(51.7 %)	61(20.3 %)	27(9.0%)	6(2.0%)	
Do you think that studying biochemistry in the integrated modular curriculum is helpful in research?	Teachers	6(11.5%)	30(57.7%)	6(11.5%)	10(19.2 %)	0(0.0%)	0.001
	Students	19(6.3%)	104(34.7 %)	108(36 %)	53(17.7 %)	16(5.3%)	
Do you think that studying Biochemistry in the integrated modular curriculum enhances communication skills?	Teachers	7(13.5%)	25(48.1%)	13(25.0 %)	6(11.5%)	1(1.9%)	0.000
	Students	16(5.3%)	75 (25.0%)	111 (37.0%)	77 (26.5%)	18(6.0%)	

Do you feel there is too much information provided in short time while learning Biochemistry in the integrated modular curriculum?	Teachers	13(25.0%)	18(34.6%)	15(28.8%)	6(11.5%)	18(34.6%)	0.000
	Students	131(43.7)	115(38.3%)	32(10.7%)	21(7.0%)	1(0.3%)	
Have you faced difficulty in developing integration between subjects while learning Biochemistry?	Teachers	14(26.9)	29(55.8%)	4(7.7%)	5(9.6%)	0(0.0%)	0.001
	Students	69(23.0%)	109(36.3%)	63(21.0%)	54(18.0%)	5(1.7%)	

This study also included questions specifically addressing issues faced by students, the related quantitative findings are summarized in Table 2. From the students' perspective, some reported that the integrated medical curriculum helped clarify their concepts (164 students) and promoted good collaboration between theoretical content and practical application (173 students), while others held an opposite view (53 and 58 students, respectively). Certain areas, however, were identified as needing improvement. A major concern was the need for more time to prepare for exams and assessments, expressed by 239 students, while only 28 disagreed. Similarly, 203 students reported experiencing an increased cognitive load in the integrated curriculum, whereas only 32 disagreed. On a positive note, 43% of students believed that the integrated approach supported the development of social interactions and peer discussions, while 32.7% remained neutral.

Figure 3: Lack of time for revision

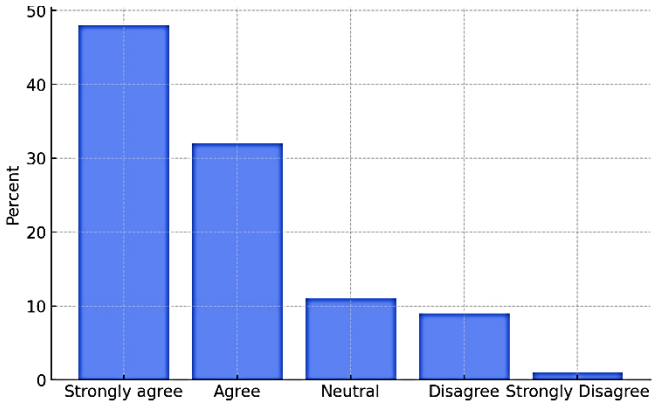


Figure 4: Helpful in peer discussion and social interactions

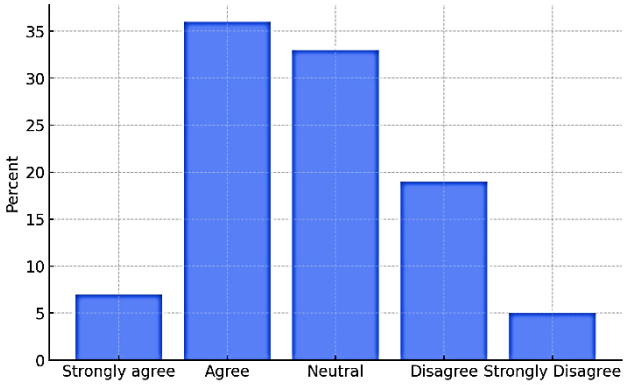


Table 2: Students' Perspectives on the Integrated Medical Curriculum

Items	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
Do you think that studying Biochemistry in an integrated modular curriculum has improved retention of Biochemistry Concepts	34(11.3%)	130(43.3 %)	83(27.7%)	42(14.0%)	11(3.7%)
Do you think that biochemistry practicals included in integrated modular curriculum collaborate with the theory content?	45(15.0%)	128(42.7 %)	69(23.0%)	42(14.0%)	16(5.3%)
Does studying Biochemistry in the integrated modular curriculum help in peer discussions and social interactions	21(7.0%)	108(36.0 %)	98(32.7%)	58(19.3%)	15(5.0%)
Do you feel there is lack of time for revision while learning Biochemistry in the integrated modular curriculum	144(48.0 %)	95(31.7%)	33(11.0%)	27(9.0%)	1(0.3%)
Do you agree that studying Biochemistry in the integrated modular curriculum has increased the cognitive load?	80(26.7%)	123(41.0 %)	65(21.7%)	31(10.3%)	1(0.3%)

4. DISCUSSION:

Being in an era of transformation in medical education in Pakistan from the previous traditional method to the novel student-centered approach, there is a dire need to identify and bring forth the perceptions of both teachers and students to lime light. Our study is an effort towards accepting and implementing the integrated medical curriculum in the best possible way. Our results show that students and teachers demonstrated concurrence in both agreement and disagreement regarding the same aspects.

Matinho et al. (2022) reported in a review article that 54% of the included studies described integration as being grounded in one or more educational theories, such as Bloom's taxonomy, cognitive load theory, social constructivism, and Gagné's instructional design model. In the present study, both students and teachers were generally satisfied with the integrated curriculum and acknowledged its role in enhancing communication skills, research culture, clinical relevance, and assessment policies. [7]

In the present study, both students and teachers were generally satisfied with the integrated curriculum and acknowledged its role in enhancing communication skills, research culture, clinical relevance, and assessment policies. Comparable results were reported by Mohamed and Radwa Hamdi Bakr et al. (2023), who found that students enrolled in integrated curricula showed greater improvements in communication skills, practical performance, and motivation for learning compared with those studying under traditional systems.[8] These findings were further supported by Kausar et al. (2024).[9]

In alignment with our results, Aslam K et al. (2023) found that teachers engaged in facilitating and teaching in an integrated modular curriculum perceived both benefits and drawbacks.[10] Jagannatha et al. (2025) demonstrated that incorporating self-directed learning into traditional lectures improved post-test performance.[11] In another study, Yoon et al. (2022) used a questionnaire-based survey to validate learning outcomes in a revised integrated oral biochemistry curriculum, with 86% of participants responding positively to the learning objectives.[12]

5. LIMITATIONS:

Since the study involved students of only one medical college, the findings may not reflect the experiences of other institutions. Further studies across multiple colleges implementing integrated curricula could yield a more comprehensive understanding of faculty and students' perspectives and related challenges.

Authors Contribution

Concept & Design of Study: Lubna Aftab, Nabeela Faisal, Fauzia Jan,

Drafting: Lubna Aftab, Abdul Rahman Abid

Data Analysis: Humera Usman, Farzana Hakim,

Critical Review: Lubna Aftab, Nabeela Faisal, Fauzia Jan.

Final Approval of version: All above approved the final version.

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