Hybrid Versus Traditional Teaching in the Subject Of Anatomy: A Comparison Based On Results Of Students

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ABSTRACT

Objective: To assess the results of hybrid and traditional teaching systems and their implementation based on student evaluation in anatomy.

Study Design: Cross-sectional study.

Place and Duration of Study: Anatomy Department, Central Park Medical College, Lahore Pakistan, from Jun 2022 to Jun 2023.

Methodology: The study was conducted on the first-year medical students of 2021 who were taught via integrated modular systems at the level of temporal coordination. Teaching strategies were changed from didactic lectures to interactive large-group lectures and small-group discussions. The results of their continuous assessment and professional exams were compared and analysed.

Results: The proportion of failed students in the Modular-Group was 20.8%, whereas 79.2% in the Non-Modular-Group. The learning system was statistically significantly related to performance in professional exams. A significant difference exists between internal assessment and professional exam scores of students in traditional and modular teaching. The relationship between the results of internal assessment and professional exams was highly positive (r=0.79) and statistically significant (p<0.001).

Conclusion: Students' performance was better in assessment throughout the year in the traditional system, whereas the professional exam results were better in the modular system.

Keywords: Anatomy, Hybrid/Integrated teaching, Undergraduate medical education.

INTRODUCTION

Medical education is undergoing a rapid transformation in which innovative teaching methods and barriers to learning are being breached. Globally, it makes learning fragmented and challenging for both students and teachers. A good teacher deals with students' learning challenges and supports their practical learning. There are different kinds of teaching approaches.[1,2] In this study, we are focused on traditional and modular approaches.[3] The traditional approach includes the most common teaching methodology, didactic lectures. This method does not encourage the active participation of students, and a lack of analytical thinking and problem-solving skills is seen.[4] Whereas modular teaching is an advanced learning method. It encourages active participation, application of knowledge, analysis, and creativity, which results in better learning for students. Integrated modular teaching is proving beneficial for both students and teachers.[5] Modules incorporate teaching modalities like self-directed learning, problem-based learning, small group activities, and interactive buzz group activities for active learners' participation.[6] The curriculum is designed with small, discrete modules or units, typically for a short duration, and ends with a final qualification test.[7,8] At all stages of modular teaching, the teacher should act as a facilitator and lead in communication with students. This new modular teaching and learning system aligns with the integrated approach, which provides a better understanding of the concepts.[9] This study examined the outcomes of hybrid and traditional learning systems based on the results of continuous assessment during the academic year and professional exams conducted in anatomy. The objective of the study was to assess the effect of hybrid vs. traditional teaching and its implementation based on student evaluation in the subject of anatomy.

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METHODOLOGY

The cross-sectional study was conducted at the Central Park Medical College, Lahore Pakistan, from Jun 2022 to Jun 2023 after Institutional Review Board approval (CPMC/ IRB No: 1332).

Inclusion Criteria: First-year medical students enrolled in the traditional curriculum and integrated curriculum in 2019 and 2021, respectively, were included.

Exclusion Criteria: Students enrolled in other study years were excluded.

The results of continuous assessment and professional exams of students enrolled in both years in anatomy were compared and analysed. The total number of students enrolled in 2019 was 100, and two were detainees. The admission of one student was withheld. The total number of students enrolled in 2021 was 99. The admission of three students was withheld. All the students of both sexes were included in the study, and detained students of the session 2021 under the traditional system were excluded. Modules at the level of temporal integration were prepared for the upcoming year in coordination with Biochemistry and Physiology for horizontal integration and with Pathology, Surgery, Medicine, and Gynaecology for vertical integration, keeping in mind the traditional assessment pattern and methodologies of professional exams at the University of Health Sciences, Lahore. Each subject was responsible for its teaching program. The timetable was adjusted to schedule related topics within the subjects or disciplines on the same day or week. Students studied the concepts of the different subjects separately and left themselves to uncover the relationships. Teaching strategies were changed from traditional lectures to interactive large group lectures, including chalk and talk, multimedia, 3D videos, and problem-solving. Small group discussions were incorporated into the timetables. The students were given the topic over the weekend for the subsequent small group discussion. They prepared and flipped classrooms.

Statistical Package for Social Sciences (SPSS) 26.0 version was used for data analysis. The chi-square test was used to test the association between professional exam outcomes and the teaching system. Pearson product-moment correlation was used to assess the correlation between professional exams and internal assessments. An Independent sample t-test was used to observe the statistically significant difference between internal assessment and professional exam scores across the modular and non-modular groups. Binary logistic regression was used to observe the professional exam outcome based on the learning system and internal assessment.

RESULTS

The data was collected from 197 students separated into two groups based on their learning systems. Group-I was identified as those who went through a traditional learning system and data was collected from 101 medical students (51.27%). Group-II was identified as students who underwent hybrid integration in a modular system, and data was collected from 96(48.73%) medical students in the first year. The mean age of the students was 20.00+0.23 (years).

A total of 24(12.18%) of the students failed their professional exam out of the 197. Of them, 05(20.8%) of the students who failed their professional exam were from the modular system, whereas the remaining 19(79.2%) were from the non-modular system. Similarly, 173(87.82) of the students passed their professional exam. Among those, 91(52.60%) went through modular systems, whereas 82(47.40%) were from non-modular systems. The proportion of students who passed their professional exam was comparatively higher for those students who went through the modular system. The learning system was significantly associated with the professional exam result (p-value=0.004).

The mean of the internal assessment of the modular group was 50.73+10.20, whereas it was 52.58+8.99 for the non-modular group. The mean for the professional exam was 63.16+8.00 for the modular group, while the non-modular group fell between 63.20+8.09. Statistically, at a 5% significance level, a significant difference exists between the average internal assessment score of both groups (p-value=0.02). There is an insignificant difference between the average score of the two groups in their professional exam (p-value=0.73).

The bivariate correlation between the internal assessment and professional exam results was 0.79 and was highly significant (p-value<0.001) (Figure). Individually, the difference between modular and non-modular groups' average scores in internal assessment and professional exams was statistically significant (p-value<0.001, p-value<0.001) (Table-I).

Binary logistic regression was performed to observe whether the outcome of professional exams

depends on internal assessment and the learning system. The internal assessment was statistically significant for professional exam results (p-value<0.001). Direct relation was observed between internal assessment and professional exam. The reference category for the learning system was the non-modular system. It shows that the odds of passing the professional exam were 4.21 times higher when studying in the modular system using univariate analysis. In contrast, the odds became 12.53 times higher in the modular system using multivariate analysis (Table-II).
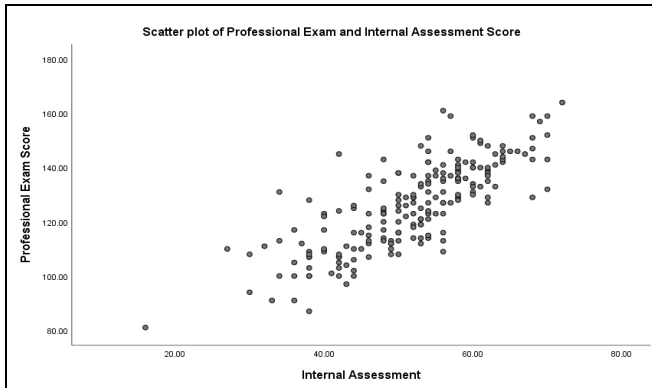

Figure: Bivariate Correlation of Professional Exam and Internal Assessment Score

Table I: Test of Average Scores of Internal Assessment and Professional Exam of Both Groups (n=197)

Study Groups	Exam	Mean	Standard Deviation	p-value
Modular	Internal Assessment	50.73	10.20	<0.001
	Professional Exam	63.16	8.00	
Non-Modular	Internal Assessment	52.58	8.99	<0.001
	Professional Exam	63.20	8.09	

DISCUSSION

A shift has been introduced in medical education from a traditional learning system to a hybrid modular system. A teacher-centred learning system was followed in medical education, where students received lectures submissively. In such a learning system, courses were taught, and assessment was conducted separately for each subject. Now, a change has been introduced in terms of an integrated modular system where the components of the curriculum were combined based on their relevance.[10-12] The current study aimed to investigate the significant difference in students' academic performance in anatomy in traditional and modular systems. The current study was a good initiative in Pakistan to observe the impact of the learning system on student's academic performance. Previously, various studies were conducted to explore the perception and viewpoint of medical students regarding modular systems.[4,12-14]

A recent study reported that community medicine and pharmacology were more liable for retention in the annual system. At the same time, anatomy was more accountable for retention in a modular system.[11] The Subject of anatomy has remained a question for learning and teaching and a strong base of medical subjects. An increased interest could be helpful in understanding and retention.[15,16] Demonstration in anatomy was also a significant content in the delivery strategy. The study observed that 84% of the medical undergraduates favoured the demonstration of anatomy in a hybrid learning system, while this was 54% in the traditional learning system.

The present study shows significantly better academic performance of students in a hybrid system than the traditional system in anatomy. The percentage of passing students in their professional exams is higher in a modular system. The learning system was significantly related to professional exam performance. Another study also supported the findings that

Table-II: Binary Logistic Regression for the Prof Exam Outcome (n=197)

Factors	Professional Exam Pass		Univariate logistic regression			Multivariate logistic regression		
	Yes	No	p-value	Un adjusted OR	95% CI for UOR	p-value	Adjusted OR	95% CI for AOR
Learning Systems								
Traditional System	82(41.62%)	19(9.64%)	1			1		
Hybrid System	91(46.19%)	05(2.54%)	0.006*	4.21	1.507-11.804	<0.001	12.528	3.239-48.467
Internal Assessment								
Internal assessment	51.68+9.62		<0.001	1.127	1.069-1.188	<0.001	1.196	1.106-1.294

the students in the modular system group achieved higher scores in anatomy.[17] A recent study also reported that a statistically significant difference was found between the environment domains of students in hybrid learning.[18] A previous study assessed the impact of traditional and integrated learning on medical students' knowledge and attitudes. By breaking anatomy down into manageable modules, students may find it easier to retain and recall information than traditional lecture-based approaches. There is an insignificant difference between the knowledge of the two groups, while a significant difference exists between the attitudes of the two groups.[14] About 80% of the undergraduate medical students favoured the modular system as practical. The modular system accommodates diverse learning styles and preferences, providing students multiple pathways to explore and understand anatomical concepts effectively. The modular approach enables progressive learning, where students can build upon foundational concepts before moving on to more complex anatomical structures and functions.[19]

The integrated system blends various teaching strategies to provide instructions on an identical topic. It can be utilised as a supplement to traditional methods in medical sciences. This approach should be continued in medical sciences. Modular systems must be preferred for their interactive nature. In addition, the Pakistan Association of Private Medical and Dental Institutions (PAMI) demanded that medical education can only grow in Pakistan with a modular system.

CONCLUSION

Our results depict that the students performed better in the continuous assessment throughout the year in the traditional system than in the modular system. The results of the continuous assessment of students in the newly introduced modular system started to improve towards the end of the session. These students faced difficulty adapting to the shift from teacher-centred to student-centred teaching. The faculty had modified their teaching approach, incorporating the student-centred strategies of the flipped classroom, including team-based learning, small group sessions, and large group interactive sessions. By the end of the academic session, the professional exam results were better due to an improved understanding of concepts due to integrated teaching in the modular system.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

HS & SH: Data acquisition, data analysis, critical review, approval of the final version to be published.

NS & RM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

RH & MJJS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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