

# A COMPARATIVE ANALYSIS OF HISTOLOGY TEST OF ANATOMY BEFORE AND DURING COVID-19 PANDEMIC MODES OF TEACHING AND LEARNING

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## ABSTRACT

**Background:** The occurrence of the COVID-19 pandemic necessitated a swift transition from traditional face-to-face education to online learning modalities. This study investigates the impact of this transition on student performance in Anatomy and Histology tests at Fatima Jinnah Medical University, Lahore.

**Objectives:** To assess the effectiveness of digital learning environments compared to conventional classroom settings.

**Methods:** A cross-sectional study design was employed to evaluate the performance of second-year MBBS students in Anatomy and Histology examinations under both traditional and online instructional methods. Data was collected on test scores and attendance rates to analyze the differences in educational outcomes between the two teaching methods.

**Results:** The analysis showed that students achieved higher average test scores in the online assessments (67.5%) than in the traditional face-to-face method (53.7%), despite a slight decrease in attendance rates in the online set-up. Moreover, there was a noticeable variation in the distribution of high achievers and failure rates between the two assessment methodologies, indicating a complex relationship between assessment modality and student performance.

**Conclusions:** The study emphasizes the potential of online education in enhancing student performance, highlighting the need for educational institutions to adapt and refine their teaching strategies in the wake of pandemic-induced challenges. These findings contribute to the discussion on the efficacy of online versus traditional education, suggesting that digital learning environments can effectively complement or even exceed conventional educational methods under certain conditions.

**Keywords:** COVID-19, Online Education, Traditional Education, Medical Education, Histology Examination, Evaluation Strategies, Online Learning.

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## INTRODUCTION

In late 2019, the world faced an unprecedented public health crisis due to the COVID-19 outbreak<sup>1,2</sup>. The World Health Organization (WHO) declared it a global pandemic in March, 2020<sup>3,4</sup>. The pandemic had

widespread consequences, including the closure of educational institutions, which required swift action from educators to maintain the continuity of education<sup>5,6</sup>.

The transition to online learning called for a critical reassessment of teaching and assessment methods<sup>7</sup>. Traditional evaluation methods were inadequate for online strategies, prompting the need for innovative instructional and assessment strategies. This period emphasized the value of collaborative learning and

identified potential shortcomings in digital modes of learning<sup>8</sup>. Educators were urged to adapt their approaches to suit the digital education landscape by integrating various remote teaching techniques<sup>9,10</sup>. The successful shift, to education, relied heavily on the preparedness and support from institutions and technology providers<sup>11</sup>. This study aims to examine the impact of the COVID-19 pandemic on medical education by comparing student performances in histology exams before and after the transition to online learning. By analyzing test scores and attendance rates at a Public Sector Medical University in Lahore, Pakistan. This research evaluates the efficacy of online education against traditional classroom settings and aims to determine the viability of virtual learning environments in medical education.

**METHODS**

Comparative cross-sectional study: Anatomy Department of FJMU, Lahore. The population and sample in this study were all students of second-year MBBS at the Fatima Jinnah Medical University, Lahore Session: 2018-2023.

**DATA COLLECTION PROCEDURE**

Before data collection, ethical approval was obtained from the Ethical Review Board (ERB). The performance reports of second-year undergraduate MBBS students in Anatomy and Histology exams were analyzed. These assessments were conducted using both web-based and traditional teaching methods. The privacy and accuracy of student performance data were carefully upheld throughout the research. The data was directly sourced from the student records kept by the Anatomy Department at Fatima Jinnah Medical University (FJMU), Lahore. Descriptive statistics were used to calculate percentages for the quantitative analysis.

**RESULTS**

Computer-assisted learning has been an aspect of education for more than fifty years coexisting alongside traditional objective structured practical/clinical examinations in medical schools. Due to the challenges posed by the COVID-19, face-to-face teaching and in-person assessment methods became impractical and a shift had to be made towards on-line teaching despite limited digital resources. This research aimed to evaluate the efficacy of digital versus traditional face-to-face student assessments. The data for this study was sourced from the evaluation of second-year MBBS students at Fatima Jinnah Medical University, incorporating metrics on percentage scores and attendance rates for histology tests conducted through

both traditional and online methods. The findings, detailed in Tables 1 and 2, reveal a distinct comparison between the two assessment methods. The average score for students assessed through the traditional method (Test 1) was 53.7%, whereas the score for those assessed by means of the web-based method (Test 2) was notably higher at 67.5%. On the contrary, attendance rates showed a different trend, with online attendance at 88.6% compared to 96.2% for in-person assessments.

Table 1: A comparison of traditional and web-based classroom scores and attendance rates.

Test 1 (on campus)		Test 2 (online)	
Mean score	Attendance	Percentage score	Attendance
53.7864±17.69217	96.2%	67.5053±12.33131	88.6%

Table 2: Independent sample T-Test.

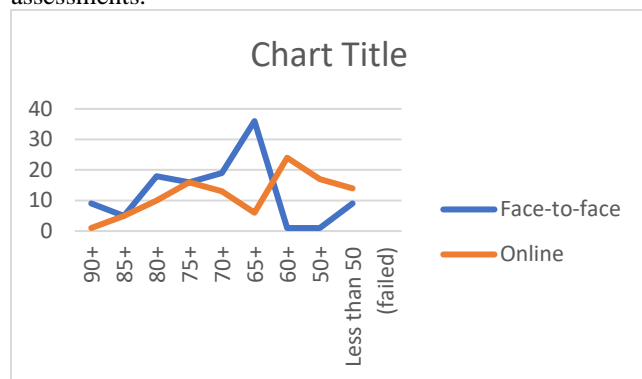
Group	N	Mean	SD	t -Test	P-value
Test 1 (on campus)	103	53.7864	17.69217	-6.280	0.000
Test 2 (online)	95	67.5053	12.33131		

Quantitative analysis was carried out for the understanding of these outcomes, specifically examining the number of students scoring above 90% and those scoring below 50% in each assessment method. As demonstrated in Table 3, a significant disparity was observed: nine students achieved over 90% in the online assessments, in stark contrast to only one student reaching this threshold in the traditional classroom setting. Furthermore, the traditional method showed a higher incidence of students failing the histology test, with scores below 50%, compared to the online method. These results underline the impacts of assessment modality on student performance and attendance, offering insights into the potential advantages of digital assessment in medical education.

Table 3. Score percentages comparison between Online and Face-to-Face Classes

Score (Percentages)	Online (No. of students)	Face-to-face (No. of students)
90+	9	1
85+	5	5
80+	18	10
75+	16	16
70+	19	13
65+	36	6
60+	1	24
50+	1	17
Less than 50 (Failed)	9	14

Fig.1 illustrates a graphical comparison of the percentage of scores between the two modes of conduction of assessments.



## STATISTICAL ANALYSIS

Data for this study was gathered meticulously and analyzed using SPSS version 23.0. The quantitative data was scrutinized by calculating means and standard deviations while categorical variables were analyzed based on frequency and percentages. The comparison of test scores was conducted via the independent sample T-test, assuming a normal and uniform distribution of data. Moreover, the relationship between student attendance and test performance was studied using the chi-square test, with a p-value of 0.05 or less being statistically significant. The study's descriptive nature and the sample sizes have been previously outlined. It was concluded that the adoption of digital testing methods in medical teaching is as effective as traditional approaches. This is particularly concluded by the observation that a greater proportion of second-year MBBS students achieved higher percentage scores in the histology test through digital means, as compared to the students who attained average scores via traditional classroom testing.

## DISCUSSION

The COVID-19 pandemic has significantly reshaped educational paradigms globally, giving rise to an urgent debate about the quality of education and the effectiveness of online teaching and assessments. Our study offers evidence that digital assessment methods are just as effective as traditional methods when it comes to medical university settings. Additionally, our results showed that digital assessment has the potential to improve attendance rates and overall performance among students. Similar to Alhefnawi's 2020 findings<sup>12</sup>, our results reveal an inclination towards higher achievement scores in online settings. However, an increase in failure rates in digital assessments points towards issues like digital literacy and the adequacy of learning environments. This imitates the concerns

similar to those raised by Alhefnawi and Boa<sup>13</sup>, who highlighted issues such as diminished student-instructor interaction and a lack of sufficient educational resources hampering the success of online learning.

Our analysis does not present a significant statistical discrepancy in performance between the two educational modalities, suggesting that student engagement and motivation play pivotal roles<sup>14</sup>. Desai's 2020 work<sup>15</sup> highlights the challenges faced by practical/clinical courses in digital methodologies, advocating for a more refined approach to online<sup>16</sup>.

The study also highlights the unequal benefits derived from web-based learning among students, particularly those in more advanced years of medical study who require different levels of skill acquisition. This emphasizes the importance of comparing how effective traditional and digital educational methods are.

Additionally, the study recognizes the potential of webinars to enhance content engagement, a view supported by Schimming. However, transitioning to digital learning poses challenges in regions with infrastructure and connectivity issues that can impede educational access and quality.

The investigation points out the distinct distractions and connectivity problems faced in less developed areas, underscoring the necessity for a carefully structured integration of online learning within medical education frameworks, especially relevant to developing countries. Although our results suggest that online education can be as effective as classroom teaching, it is essential to acknowledge that digital learning may not meet all students' needs or suit every learning scenario<sup>18</sup>. The studies mentioned only cover a part of the curriculum indicating the necessity, for further research to determine how online and traditional learning methods compare in the broader context of medical education<sup>19,20</sup>

## CONFLICT OF INTEREST:

Authors declare no conflict of interest.

## FUNDING SOURCE: None

## ETHICAL APPROVAL

Ethical approval was granted by the Ethical Review Committee of Fatima Jinnah Medical University, vide No 41/Research Proposal/Anatomy/FJ/ERC dated: 10/10/2023

## AUTHOR'S CONTRIBUTIONS

**GA:** Drafting the manuscript and analysis

**SM:** Analysis and interpretation of data

**AZ:** Conception, design of the study and Supervision

**ZF:** Data analysis and references

**ALL AUTHORS:** Approval of the final version of the manuscript to be published.

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