Students' Perception of the Blended Learning Method for Teaching Oral Pathology

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ABSTRACT

Background: In the present Covid environment, blended learning methodologies helped students stay interested in their academic work and the learning process. Our educational systems have undergone a revolution attributable to technology and e-learning resources. In this study, the DREEM questionnaire was used to assess students' perceptions of learning satisfaction and environment. We compared the learning outcomes (end-of-course test results) of an oral pathology course taught to third-year dental students by using a blended learning method.

Methods: A longitudinal observational study from March to November 2021 was conducted by researchers at Fatima Jinnah Dental College and Hospital in Karachi, Pakistan, in the Department of Oral Pathology. In the blended learning approach, interactive online lectures, recorded videos with post quizzes, cased-base discussions, concept maps and individual presentations were integrated into the curriculum. The paired sample t-test was used to make the above comparisons, and a *p*-value <0.05 was considered significant.

Results: There were 50 (62.5 percent) females and 30 (37.5 percent) males. In terms of student satisfaction with the educational environment and content knowledge, the DREEM scores in the blended learning group (35.59±4.84) were significantly (*p*<0.001) higher compared to the conventional learning group (30.86±3.53). Moreover, the blended learning mean post-test score (20.25±2.16 [95% CI 19.7-20.7]) was also significantly higher than the Conventional learning method (14.02±3.65 [95% CI 13.2-14.8]).

Conclusion: The current study found that blended learning had a positive effect on students' perceptions of the educational environment and subject knowledge. They performed better on the blended learning approach, oral pathology end-of-course MCQ-based test.

Keywords: Dentistry; Medical Education; Oral Pathology; Distance Learning; Active Learning.

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INTRODUCTION

Dental health professionals play a decisive role in the construction of academic knowledge and clinical skills of undergraduate and graduate students[1]. Dental educators must be aware of how crucial it is to expand their knowledge and learning capacity to provide the general population with quality healthcare[2]. Students will be better able to identify diseased oral tissues and comprehend the mechanisms underlying reported clinical appearances if they have a good understanding of normal oral structures[3]. When handling oral disorders in their clinical years of study, students who have a comprehensive understanding of the subject are more vigilant clinicians[4].

Technology and e-learning have become essential aspects of medical education systems as a result of the recent Covid scenario around the world[5]. To meet the changing demands of learners, medical and dental institutions in Pakistan are developing curriculum that incorporates more technology-based teaching approaches[6]. This revolution in the field of medical education is still in its try-and-error stage[7]. A blended learning method on campus (face to face), as well as online (e-learning), appeared to be an essential step in creating an effective educational environment[8]. The tools utilized in the blended learning method include Google Classroom (LMS), interactive online lectures and polls (ARS), online educational apps like Kahoot, Socrative, and Padlet (formative assessment tools), cased based discussions (CBDs) and social media pages (Facebook page)[9].

Interactive exercises in online classes, such as polls, analytical questions, explanations of images, Kahoot, and other activities, keep students engaged and reduce boredom[10]. Facilitators can evaluate students' performance and subject understanding with the aid of online educational apps[8]. Online quizzes keep interest levels high and make learning enjoyable, but they just test students' content understanding[11]. The case-based discussion might be a superior method to enhance analytical knowledge of the content [9]. It allows students to address real patient problems by integrating their existing knowledge and building on new knowledge pertinent to the scenario.

However, few studies have been conducted to evaluate the effectiveness and student satisfaction of blended learning in the undergraduate dental curriculum. In this study, a DREEM questionnaire was used to assess students' perceptions of learning satisfaction and environment. It is a validated tool to assess the effectiveness of different learning methods. Additionally, we contrasted the results of end-of-course exams for an oral pathology course offered to third-year dentistry students utilizing a blended learning approach and a traditional approach.

METHODS

From March to November 2021, researchers at Fatima Jinnah Dental College and Hospital in Karachi, Pakistan, conducted a longitudinal observational study in the Department of Oral Pathology. Raosoft was used to calculate an 80-student sample size with a 95% confidence interval and a 1% margin of error. The sampling method used was a non-probability consecutive technique. The ethical approval was obtained from the ethical review committee of the Institute (SEP-2020-OPL01). During this time, the third professional year Oral Pathology course was taught through conventional and blended learning approaches. The Dundee Ready Education Environment Measure (DREEM) questionnaire was implemented to collect information about the learning environment and satisfaction in the dental institution[12]. It was developed at the University of Dundee and has been validated as a general diagnostic method for assessing the educational learning environment and outcomes[13].

Over 32 weeks, three instructors delivered two lectures and four practical sessions totaling 8 hours of weekly instruction. Initially, there were 16 weeks of conventional teaching and 16 weeks of blended learning. Dental caries, developmental defects of teeth, dental pulp disorders, periapical periodontitis, keratotic lesions, and jaw cysts were the topics covered using the conventional method. Later, blended learning approaches were used to cover hyperplastic, infective, and malignant lesions of the oral mucosa and allied structures, bone pathology, and TMJ disorders. In the blended learning approach, interactive online lectures, recorded videos with post quizzes, cased-base discussions, concept maps and individual presentations were integrated into the curriculum. During conventional learning, interactive lectures, discussions and small group discussions were encouraged.

At the start of the new session, the objectives of the research were explained to all third-year students, and their verbal consent was obtained. Students who were willing to actively participate in the study were included. Those who were inconsistent and missed lectures/tutorial sessions were not included in the study. The effectiveness of the course was assessed using two methods: knowledge acquisition and understanding, as measured by students' scores on an MCQ-based summative exam. Furthermore, the extent to which students were satisfied with the educational environment during the course was assessed using a validated survey tool. The questionnaire, which consists of 17 questions, was adapted from a study, and slightly modified by the authors based on the context[12].

SPSS version 20 was used to analyze the study data. Quantitative variables were expressed as mean

and standard deviation (SD), whereas categorical variables were measured as frequencies (%). We compared the means of pre-test and post-test scores for both groups (blended learning and conventional learning) through paired t-tests to see if there were any differences in educational outcomes. We also investigated gender differences in post-test scores via an independent *t*-test test. By comparing the mean DREEM scores and subscales between the blended learning and conventional learning groups, the educational environment and its components were evaluated. The paired sample t-test was used to make the above comparisons, and a *p*-value <0.05 was considered significant.

RESULTS

Study participants ranged in age from 20 to 22 years, with a mean of 21.5. There were 50 (62.5 percent) females and 30 (37.5 percent) males. Details on how to interpret the DREEM score and subscale scores can be found in Table 1.

Table 1: Descriptive statistics of DREEM and its subscales' measurement.

DREEM	Scores	Conventional Learning n (%)	Blended Learning n (%)	Interpretation
SPL	0 – 12	0 (0%)	0 (0%)	Very poor
	13-24	55 (68.8%)	5 (6.3%)	Teaching is viewed negatively
	25-36	15 (18.8%)	23 (27.5%)	A more positive perception
	37-48	10 (12.5%)	52 (66.3%)	Teaching highly thought of
SPT	0-11	2 (2.5%)	0 (0%)	Abysmal
	12-22	20 (25%)	4 (5%)	In need of some retraining
	23-33	48 (60%)	46 (57.5%)	Moving in the right direction
	34-44	10 (12.5%)	30 (37.5%)	Model teachers
SASP	0-8	0 (0%)	0 (0%)	Feeling of total failure
	9-16	35 (43.8%)	5 (6.3%)	Many negative aspects
	17-24	39 (48.8%)	45 (56.3%)	Feeling more on the positive side
	25-32	6 (7.5%)	30 (37.5%)	Confident
SPA	0-12	10 (6.3%)	0 (0%)	A terrible environment
	13-24	45 (56.3%)	16 (20%)	Many issues need changing
	25-36	20 (25%)	50 (62.5%)	A more positive atmosphere
	37-48	5 (6.3%)	14 (17.5%)	A good feeling overall
SSSP	0-7	5 (6.3%)	0 (0%)	Miserable
	8-14	40 (50%)	10 (12.5%)	Not a nice place
	15-21	30 (37.5%)	55 (68.8%)	Not too bad
	22-28	5 (6.3%)	15 (18.8%)	very good socially

SPL (Student's perceptions of learning); SPT (Student's perceptions of teachers); SASP (Student's academic self-perceptions); SPA (Student's perceptions of the atmosphere); SSSP (Student's social self-perception).

In terms of student satisfaction with the educational environment, the DREEM scores in blended learning (35.59±4.84) were significantly (*p*<0.001) higher compared to conventional learning (30.86±3.53).

DREEM subscales showed a similar pattern. The change was especially noticeable in students' perceptions of teaching, learning, and academic self-perception in the subscales (Table 2).

Table 2: DREEM overall and subscale scores for blended learning and traditional learning study groups.

Learning Methods		Mean±SD	p-Value
SPL	Blended learning	3.6000±.06797	<0.001*
	Traditional	2.4375±.70878	
SPT	Blended learning	3.3250±.56870	<0.001*
	Traditional	2.8250±.67082	
SASP	Blended learning	3.3125±.58664	<0.001*
	Traditional	2.6375±.62122	
SPA	Blended learning	2.9750±.61572	<0.001*
	Traditional	2.2500±.75473	
SSSP	Blended learning	3.0625±.55902	<0.001*
	Traditional	2.4375±.70878	
DREEM Overall Score	Blended learning	3.255±0.47961	<0.001*
	Traditional	2.517±0.69286	

*DREEM items: Mean score of 3 or greater=Positive, mean score between 2 and 3=Could be enhanced or improved, a mean score of 2 or less=Problematic area, *p-value <0.05 considered as significant; CI: confidence interval, Paired sample t-test.*

The pre-test scores of blended learning (13.67±3.74 [95% CI 12.8-14.5]) and conventional learning (12.95±2.84 [95% CI 12.3-13.5]) groups did not differ significantly. However, the blended learning group's mean post-test score (20.25±2.16 [95% CI 19.7-20.7]) was significantly higher than the Conventional group's (14.02±3.65 [95% CI 13.2-14.8]) (Table 3). In both groups, there was no difference in pretest scores based on gender and age. The post-test findings demonstrated that the blended learning tools enabled the boys to do better on the tests, although statistical results are inconsequential on the *t*-test. The post-test scores were significantly higher (*p*=0.02) in the 21-23 age group compared to the 24-26 age group in the BL group.

Table 3: Statistical analysis of mean scores of pre-and post-test for the blended learning and traditional learning methods.

Variables		Paired Differences					p-Value
		Mean	Std. Deviatio	Std. Error Mean	95% Confidence Interval of the Difference		
					Lower	Upper	
Blended learning method	Pre-test/Post-test	-6.57500	3.37817	.37769	-7.32677	-5.82323	<0.001*
Conventional learning method	Pre-test/Post-test	-1.07500	4.72209	.52795	-2.12585	-.02415	0.045*

* Paired samples t-test/p-value <0.05.

DISCUSSION

The blended learning method (BL) is a cross between an e-learning component and face-to-face sessions, combining the benefits of both[13,14]. This approach enabled flexible scheduling so that each student watch the recorded videos and participate in the discussion tasks or quizzes at their pace[15,16]. Students took ownership of their education in this way, which increased their motivation for academics and helped them remember the content better[17,18]. In this study, the DREEM tool was used to assess students' learning experiences in both the BL and conventional approaches. Students' total DREEM scores were higher for the blended learning strategy used during the Covid time than they were for the traditional learning approach.

In this study, the facilitator ensured to make content interesting for students by integrating active learning techniques such as interactive online lectures and

polls, recorded online lectures with post quizzes, discussion activities on the official Facebook page, case-based discussions, concept maps and individual presentations[19,20]. Students were captivated by interactive exercises in online lectures including "describe the image", "label the diagram", "MCQ" and "polls" which also allowed the facilitator to evaluate students' performance. The Facebook page's content-related images attracted students' active participation, and a thorough discussion resulted from one probing inquiry leading to another. The face-to-face session included an analytical learning strategy case-based discussion where the knowledge learned in the online sessions was used to resolve practical problems.

In this study, we found that students' perceptions of blended learning approaches were highly thought of indicating that students gained a sound understanding of content, had inner motivation, and had more opportunities for engagement during the learning process. The blended learning approach encouraged in-class collaborative activities focused on higher order cognition based on academic content that students accessed before class[21]. Through group activities, students developed their higher-order thinking, problem-solving, and critical thinking abilities. They used what they had previously learned to create new knowledge and applications[22,23]. The second DREEM subscale indicated that the faculty delivering the content was sufficiently trained to plan and engage students in an active learning process that would make them confident, competent, and self-directed learners. Although faculty acknowledged that there is still room for improvement before they can be considered exemplary, students believed they were making progress in having them teach the relevant subject-specific content.

The third area of DREEM clearly stated that students' academic self-perception was very positive, allowing them to achieve high scores on the tests. The study's post-test scores also revealed a significant difference in test scores of students taking an oral pathology course using the Blended learning method versus the conventional method. The test scores showed that learning tools used in the blended method aided boys to improve their scores on the tests. This might be the case because boys tend to be more active and favor technology-based activities that let them engage in hands-on, enjoyable learning[19]. These findings are consistent with previous studies in which learners performed better in the blended learning group than those in the conventional method[8].

In the study, students at first thought the subject of oral pathology was complicated, drawn-out, and volatile. The conventional method of instruction dulls learning, constricts the attention span, and students feel sleepy during lectures. However, the academic environment started to gradually change when we implemented the blended learning approach. As the classes went on, many obstacles were overcome, and students showed a positive attitude. At the student level, the most common challenges were gaining access to online videos, learning new apps to perform tasks, and dealing with internet issues in many areas of Pakistan[24,25]. However, thanks to the collaborative efforts of management, students, and parents, these issues were resolved to a greater extent.

Like this, the Department of Oral Pathology encountered some difficulties when putting this innovative blended learning strategy into practice. Among the factors considered were the faculty's training, the quality of their internet connectivity, technological know-how, the planning, and design of the courses, and continual evaluation[26]. The attributes ensured the smooth operation of the course and reduced the glitches that might have arisen during the course implementation. We did our best to ensure effective implementation and good collaboration between the department of oral pathology, the department of medical education, and administrative personnel.

CONCLUSION
A blended learning approach had a positive effect on students' perceptions of the academic work and educational environment. Students in their third year who took online and face-to-face classes using this method said it helped them become more independent learners and encouraged academic improvement. They performed better throughout the learning activities as well as end-of-course MCQ-based tests. Additionally, we found that topics covered in blended learning were better understood when participants actively participated in discussions and used their critical thinking, problem-solving skills, and engagement to the greatest extent.

CONFLICT OF INTEREST
The authors declared no conflict of interest.

ETHICS APPROVAL
Ethical approval was obtained from the ethics review committee of the institute with the reference code: (SEP-2020-OPL01).

PARTICIPANT CONSENT
The data was collected after the consent of the participants.

AUTHORS' CONTRIBUTION
MF did the study design, literature search, prepared questionnaire, data collection, data analysis with

data interpretation and manuscript writing. GA supported in study design and concept, literature search and proofreading. FS also assisted in study design, literature search and data collection.

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