

Original Research



# A Comparison of traditional learning and web-based blended education in a practical oral pathology course for students of dentistry at the Birjand University of Medical Sciences

Zahra Ghamkhah<sup>1</sup>, Leili Alizadeh<sup>2\*</sup>, Freshteh Osmani<sup>3</sup>

<sup>1</sup>Student Research Committee, Birjand University of Medical Sciences, Birjand, Iran

<sup>2</sup>Department of Oral and Maxillofacial Pathology, Birjand University of Medical Sciences, Birjand, Iran

<sup>3</sup>Infectious Diseases Research Center, Birjand University of Medical Sciences, Birjand, Iran

## Article info

### Article History:

Received: 9 January 2022

Accepted: 12 April 2022

Published: 12 June 2022

### Keywords:

Traditional education

Blended web-based

education

Oral pathology

Dentistry students

## Abstract

**Background:** Practical courses in oral pathology are currently taught in classrooms. However, traditional in-person learning does not meet current educational needs. On the other hand, electronic learning has its own drawbacks. Blended learning is a combination of traditional in-person and electronic learning. This study aimed to compare the effects of traditional and blended educational methods in a practical oral pathology course.

**Methods:** The current study was a quasi-experimental study conducted at the Birjand University of Medical Sciences in 2021. The study participants consisted of students in their fourth year of a dentistry program. In all, 34 students who were selected randomly participated. A portion of the lessons of the practical oral pathology course two were uploaded to the Birjand University of Medical Sciences content management system, Navid, as digital images. Participants were assigned to one of two groups based on the average of all students rather than randomly. One group studied digital material from the Navid system before attending class (blended) and one group only attended class in person (traditional). Both groups attended the same classroom teaching sessions. After a period of time, students taking the blended and traditional methods were evaluated. Evaluation data were entered into statistical software, and the effect of traditional and web-based blended learning on students' learning was compared using a t-test.

**Results:** A total of 34 students taking Practical Oral Pathology II in the first semester of 2020-2021 participated in the study. There were 23 female (67.6%) and 11 male (32.4%) students. The mean age of was 22.42 years. Of 34 participants, 17 students attended traditional classes (6 male and 11 female). In addition, 17 students attended blended traditional-virtual classes (5 male and 12 female). Learning was evaluated based on the students' evaluations scores in a range of 0 (lowest) to 6 (highest). The traditional and blended groups had mean scores of 3.6 and 4.3, respectively. The mean difference between the traditional and blended groups' final exam score was statistically significant ( $P=0.015$ ).

**Conclusion:** Web-based education can be used as a complementary educational method alongside traditional education to have a greater impact on student learning.

## Introduction

Recently it has been seen that traditional teaching methods do not always meet students' and institutional needs and traditional teaching methods have been under review as a result.<sup>1,2</sup> E-learning, on the other hand, does not provide a real sense of the educational space due to the cold and mechanical nature of the learning environment, as well as the lack of vital and spontaneous interaction between professors and students.<sup>3</sup>

Blended learning is a method of learning in which

various educational activities, such as conventional face-to-face teaching, web-based blended learning, and audio-visual educational facilities, are utilized in the teaching-learning process.<sup>1</sup> Advanced information technology has provided the opportunity for new e-learning tools through web-based distribution.<sup>4,5</sup> Some advantages of this method include reducing educational costs, teaching from any place and at any time, ability to repeat or review learning, and helping refocus the education system from teacher-centered to student-centered.<sup>6</sup> Combining traditional

\*Corresponding author: Leili Alizadeh, Email: [alizadeh13642001@yahoo.com](mailto:alizadeh13642001@yahoo.com)

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and virtual learning can eliminate many limitations of e-learning alone.<sup>7</sup> Due to recent technological advances and easy access to electronic facilities, teaching methods should also be improved to meet the needs of the student community.<sup>8</sup> Pathology, which focuses on diseases, is an important topic in the field of oral studies in dentistry.<sup>9</sup> Dentistry schools face significant challenges in providing appropriate and interesting pathology curricula.<sup>10,11</sup> In the traditional educational method, dental education is teacher-centered and does not pay particular attention to students' learning speed.<sup>6,12</sup> This study aimed to design a blended teaching method to evaluate and compare the effects of blended web-based and traditional learning in a practical oral pathology course for students of dentistry, at the Birjand School of Dentistry. This type of study has not been previously conducted at this institution. The study results can help professors of dentistry improve the teaching-learning process of dental students through their awareness of the effects of blended web-based education.

### Materials and Methods

The current study was a quasi-experimental study conducted at the Birjand University of Medical Sciences in 2021. The study population consisted of fourth-year general dentistry students at the Birjand University of Medical Sciences who had successfully passed Practical Oral Pathology I and were enrolled to study Practical Oral Pathology II. Eligibility criteria were fourth-year dental students who had passed Oral Pathology I and had not previously taken Oral Pathology II. In all, 34 students, who were selected randomly, participated. Students were divided into two groups, 17 in a control group (traditional) and 17 in an intervention group (virtual-traditional blended). The two groups were homogeneous in terms of age, sex, overall grade point average, and number of credits achieved. According to Cochran's sample size determination formula and considering 70% and 90% confidence intervals, the sample size in each group was determined to be 17. Participants were assigned based on their averages in the two groups rather than randomly; therefore, it was quasi-experimental. All participants in the study completed informed consent forms.<sup>13</sup>

### Methods

A portion of the lessons for Practical Oral Pathology II were uploaded to the Navid system as digital images. This content included five pathological lesions that students would learn in Practical Oral Pathology II. The blended group was asked to study the relevant lesions in the Navid system. Only these students had access to this content. Both groups attended in-person lectures on these pathological lesions in a traditional classroom. The entire study population took an examination at the end of the semester. It should be noted that the test consisted of a student evaluation conducted by observing the microscopic appearance, histopathological diagnosis, and

microscopic description of the lesion. Participants, staff, and study personnel were blinded to each participant's group. All participants who began also completed the study. All participants were followed up in each group, there was no loss-to-follow-up, and data were collected in the same way.

### Results

A total of 34 students taking Practical Oral Pathology II in the first semester of 2020-2021 voluntarily participated in the study. Their learning was evaluated based on examination scores with a range of 0 (lowest) to 6 (highest). Demographically, the distribution of students by sex was 23 females (67.6%) and 11 males (32.4%). The participants had a mean age of 22.24 years. The 34 participants were divided into two groups: 17 students attended traditional classes (6 males and 11 females), and 17 students attended blended traditional-virtual classes (5 males and 12 females). In comparing age, sex, overall grade point average, and number of credits achieved, there were no significant differences and relative similarities between the two groups. All participants in the study were familiar with the web-based blended teaching method. The mean scores were 3.6 and 4.3 for the traditional and blended groups, respectively.

The result of an independent *t* test showed a significant difference between the mean scores of traditional and blended teaching methods ( $P=0.015$ ), with the blended group achieving higher mean scores (Table 1). Differences are considered significant at  $P<0.05$ .

### Discussion

As stated in the introduction, traditional education presents many challenges in the present age. On the other hand, virtual and electronic education has its own disadvantages in addition to numerous advantages. Therefore, web-based blended teaching (virtual-traditional) may be one solution to take advantage of e-learning while ameliorating its disadvantages. Therefore, this study designed a web-based blended teaching method and evaluated its effect in a practical oral pathology course for dentistry students and compared it with traditional (common) teaching methods. There was a significant difference between the mean scores of the traditional group (3.6) and blended (4.7) teaching methods ( $P<0.05$ ). The higher mean score of the blended group indicates that this virtual teaching method, where students have a chance to review digital images and content before an in-person lesson, can be a good complement to traditional methods and can significantly affect traditional teaching to the extent that virtual-

**Table 1.** T-test results for students' mean scores across traditional and blended groups

	Mean	No.	SD	t	P value
Traditional	3.55	17	0.84	-2.583	0.015
Web-based blended	4.27	17	0.78		

traditional blended methods may have a greater impact on students' learning. Therefore, blended education may provide an opportunity for students to benefit from virtual training, along with new technologies and electronic and web-based teaching methods if the Ministry of Health does not intend to replace traditional teaching methods with virtual and electronic ones. (Suggested rephrase: However, there are many obstacles to utilizing a blended education plan, such as its coordination, the difficulty of students cooperating during the coronavirus epidemic as well as the lack of funding to develop more media clips for the oral pathology course.)

Zolfaghari et al,<sup>14</sup> aimed to evaluate the effectiveness of blended e-learning in nursing and midwifery students and found a statistically significant positive difference between student scores and participation rates compared to the traditional method. They concluded that blended e-learning could enhance learning as a new mechanism. The results of their study are consistent with our study in terms of the effectiveness of blended teaching.

Kavadella et al<sup>15</sup> evaluated blended learning for teaching oral radiology among dentistry students. The students in the blended education group performed significantly better than the students in the traditional education group in the post-course exam, and their results are in line with the results obtained in the current study.

Faraone et al<sup>16</sup> examined blended learning in the teaching of a complete prosthetic preclinical course. Students' performance was high during the course, indicating that the blended curriculum provided laboratory and training skills necessary for an adequate peripheral environment, which is consistent with the results of the current study.

Roohi et al<sup>17</sup> compared traditional and traditional-electronic blended training in a practical oral pathology course among students of dentistry. There was a significant difference between the mean scores of traditional and blended methods, with higher scores in the blended teaching method, which was in line with the results of the current study.

Vosough Hosseini et al<sup>18</sup> found the mean scores of students in a practical oral pathology course were higher in the traditional-electronic blended group than in the traditional group, although this difference was not statistically significant.

The results outlined above, including the current study, indicate that e-learning is attractive for students and can be used as a suitable solution in combination with traditional methods to improve the quality of education and motivate learning. The results of the study can be extended to other courses.

### Conclusion

Finally, it can be concluded that web-based blended learning is a new mechanism that integrates a variety of learning and teaching methods and can enhance learning through flexibility and taking advantage of both

traditional and e-learning teaching methods. Web-based blended education should be considered as a method of providing effective education in medical universities across the country. It is also noteworthy that the use of a web-based blended approach requires prerequisites such as equipping university computer centers and empowering professors and students in the use of new technologies, as well as creating a culture and changing scientific attitudes towards e-learning.

### Acknowledgments

We would like to thank all the students who volunteered to help us with this project and the dear professors who guided us in the process of this research.

### Authors' contribution

ZG and LA designed the experiments. ZG collected data. FO performed the statistical analyses. ZG wrote the results section, interpreted the results, and wrote the initial manuscript. LA critically reviewed and modified the manuscript. All authors approved the final manuscript.

### Ethical approval

The Ethics Board committee of the Birjand University of Medical Sciences approved all procedures in this study, reference number: IR.BUMS.REC.1399.328.

### Competing interests

The authors declare that there is no conflict of interest.

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