

Original Research

Using E-learning in Teaching the Quality of the Practical Oral Pathology on Dentistry Students

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Abstract

Introduction: The rapid development in computer technology and the wide availability of personal computers together with the Internet, email, and various medical literature retrieval applications have changed both the study and the practice environments in dentistry, as they have in other fields. Electronic learning allows students to work at their own time and pace. In the field of pathology, this is even more important because by traditional methods, the review of lessons is only possible in labs and with presence of microscopes. This study aimed at evaluating the efficacy of a new educational technique in the field of practical pathology in dentistry.

Methods: In this quasi experimental, combined with retrospective and prospective study, 82 dentistry students were recruited from Tabriz Faculty of Dentistry. The final scores of the 41 students whose course was based on a traditional method (Traditional Group) in the field of practical pathology were recorded. In the other group, however, a software containing multimedia information with the slides related to pathologic samples was provided along with the traditional educational method and the scores were recorded (New Group).

Results: The mean score of practical pathology was 16.23 ± 3.36 (range 8-20) in the new group and it was 15.22 ± 3.52 (range 5-20) in the traditional group. Accordingly, the mean scores of the students in the new group were higher than the traditional group; however, this difference was not statistically significant ($P=0.19$).

Conclusions: The scores of the practical pathology in dentistry may be enhanced if the traditional method is conducted along with supplementary multimedia software.

Introduction

Oral and maxillofacial Pathology is a specialized field in dentistry and Pathology that deals with the nature, identification and control of oral and maxillofacial diseases. So this field is of unique importance among dentist and doctors in terms of community health. Obviously, graduate dental professionals (including general dentists, specialists and dental hygienists) should be fully aware of pathogenicity, clinical manifestations, treatment and prognosis of oral and maxillofacial diseases. It is also important for medical practitioners, particularly the specialists in fields such as ears, nose and throat, dermatology and pathology to have a good knowledge on the above mentioned.^{1,2}

This field is one of the core courses in dentistry provided both theoretically and practically in the first semesters of general dentistry (semesters V and VI), after passing basic sciences.

Theoretical courses are taught by the faculty members

of the department, and relevant sources are introduced and the student learning level is assessed through a written examination at the end of each semester.^{2,3} But the main problem of teaching has been related to practical subjects of this course. Since practical teaching of pathology requires microscope and microscopic slides, the possibility of using the facilities in the ward only in the working hours has always been a problem for the students. Furthermore, considering the different groups of students and curriculum planning by Dentistry Education Department, only a few hours are assigned for each group. Therefore, due to the current problems in learning the microscopic features of oral lesions and unavailability of the slides out of class hours to study and review, we have decided to produce software as an educational aid to solve the aforementioned problems. This educational process can be effective in teaching, academic guidance and learners' assessment.⁴ True histological understanding

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of a tissue requires a three-dimensional view, therefore, to address the problem, the teachers turned to multimedia for teaching.⁵ The use of a computerized atlas before working with a microscope makes learning easier so that finding the desired structure in microscope can be faster. Besides, time limit in learning is eliminated. Computer tools for teaching students were used in some countries from 1950 to 1959.⁶ Skinners were among the first tools that were turned into teaching machines very soon and in the mid-sixties, these machines were completely replaced by computer. Development in computer in years 1980-1989 led the computer to become an intelligent tutor. Multimedia tools were quickly replaced older methods of teaching in years 1990-1998.⁶ So, learning and practicing more to achieve learning objectives were provided for students without a need to microscope, teacher and attending in practical classes.

Frequent access of students to these training aid resources has basic role ineffective learning of practical skills. Increasing self-confidence as the result of improving learning and psychomotor and cognitive skills, improving students' exam scores and not imposing any additional cost for the institution can be considered as the other advantages of using this software.

Providing multimedia tools (videos, discs and CDs.) is more economical in training, some faculties have stopped the use of the microscope and replaced multimedia micrographs for training.⁵ using multimedia programs to teach the courses dependent on image-such as anatomy and histology and pathology is very useful.^{7,8} This efficiency has also been emphasized in dental education.⁹ The aim of the present study was to examine the efficiency of using educational software in practical oral pathology scores of dentistry students.

Materials and Methods

In this quasi experimental study combined with retrospective prospective, the scores of all students of Tabriz Dental School choosing practical pathology 1 and 2 in academic years of 2010-2011 and 2011- 2012, were studied as census based during 9 months (from early October until end of June 2012). The study was approved by the Ethical Committee of Tabriz University of Medical Science and the students' names were kept confidential.

The students passing practical pathology course (two different entrances) were divided into two groups. One group was trained by the traditional method (traditional group). This group included the students who chose practical pathology in 2010-2011 academic year and their scores were collected retrospectively.

In the other group, the students were given software (CD-ROM) as the educational aid package (a new group). The group included the students choosing this course in 2011-2012 academic years. Their scores were collected after providing them with the educational aid package. This package can be used with tools such as a personal computer out of the class and university as well as after graduation. In the package, the best images of pathology

samples were selected and then they were put in the appropriate arrangements, and the subjects were presented in the best possible way in a minimum of time.

This educational package is based on Oral Pathology book by Neville which is the reference for this course. The two groups were exactly the same in terms of teaching and teachers, but one group used the educational software as the educational aid (the new group).

Finally, practical pathology test scores in the two groups were compared.

The statistical analysis

Statistical analysis was done using SPSS 17. Quantitative data have been shown as mean±standard deviation and median and qualitative data as frequency and percentage. T-test was used for data comparison in independent groups (Independent Samples *t*-test).

The results of this test were considered significant in case of $P < 0.05$.

Results

The frequency and percentage of the dentistry students' scores in practical pathology in both traditional and new groups are summarized respectively in Figure 1 and Table 1.

The mean score for practical pathology test was 16.23 ± 3.36 in the new group (median 17, range: 8 to 20) and it was 15.22 ± 3.52 in the traditional group (median 15, range: 5 to 20) (Figure 2).

Based on the results of *t*-test for independent groups, the mean scores of the two groups in practical pathology were not statistically significant ($P = 0.19$).

Discussion

In the present study, the efficacy of traditional education in oral pathology course was compared with modern education in terms of practical test scores of dentistry students. In the new method, in addition to traditional training routines, software was given to the students to review the course outline and the related slides.

We concluded that the average scores of students in new method were higher than the traditional group, although this difference was not statistically significant (16.23 ± 3.36 vs. 15.22 ± 3.52 , $P = 0.19$). In the United States, it was demonstrated that multimedia educational aid program has been effective in Department of Pediatric Dentistry in terms of encouraging students and improving education level.¹⁰ In this study, 80% of the dentistry students preferred new method to the traditional method of teaching.¹⁰ In the study of McCann et al., 74% of dentistry students believed that educational aid methods should be used along with traditional methods.¹¹ The effect of education using computer-assisted programs in dentistry schools in Britain, the Netherlands and the United States were examined. Finally, it was shown that these educational aid programs are effective in motivating dentistry students and promoting education quality. In this study, the software with combination of text, image and sound has

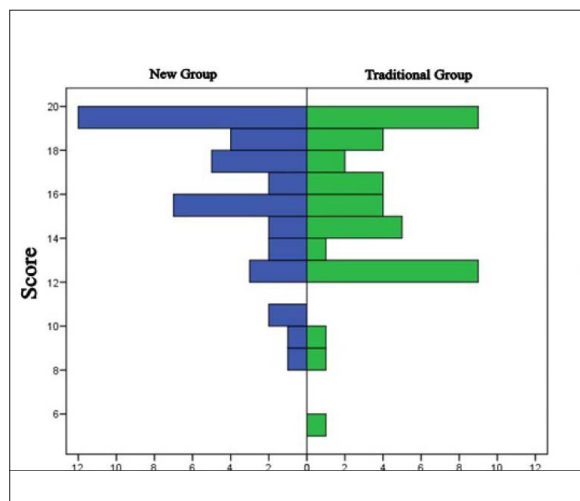


Figure 1. Frequency of practical pathology scores of dentistry students in both traditional and new groups

Table 1. The percentage of test scores of dentistry students' practical pathology in both traditional and new groups

Traditional method	New methods	Score
2.4	0	5
0	2.4	8
2.4	0	8.75
2.4	0	9.25
0	2.4	9.5
0	4.9	10
17.1	7.3	17.12
2.4	0	12.25
2.4	0	12.75
2.4	2.4	13
0	2.4	13.5
7.3	2.4	14
4.9	2.4	14.5
9.8	7.3	15
0	9.8	15.5
2.4	2.4	16
2.4	0	16.25
4.9	2.4	16.5
4.9	2.4	17
0	9.8	17.5
2.4	2.4	18
4.9	7.3	18.5
2.4	0	18.75
7.3	2.4	19
4.9	0	19.25
2.4	9.8	19.5
7.3	17.1	20

been emphasized.¹² Nance et al. evaluated the effect of computer-based educational aid in dental anatomy carving. The scores of the students who used the educational aid software were higher than traditional group as well. However, the difference was not statistically significant.¹³ Similar result was obtained from the study conducted by Chew and Stiles. In this study, the role of the educational aid methods including video disc in teaching practical

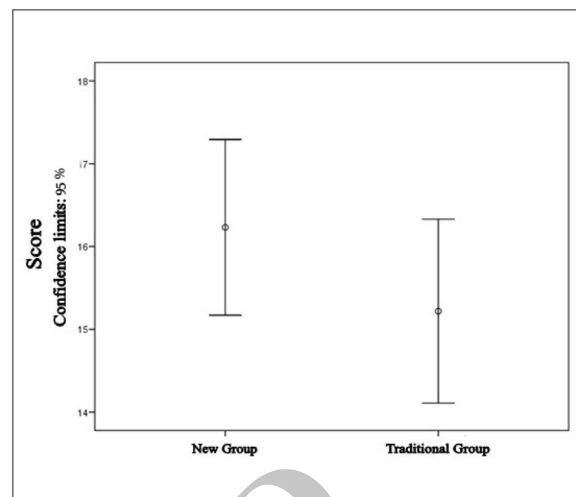


Figure 2. Error bar figure of dentistry students' mean scores in practical pathology in both traditional and new groups

radiology was compared with the traditional method. Accordingly, it was reported that the mean scores of the students in the new group were insignificantly higher than the traditional groups.¹⁴ In the study of Farahand Maybury in Australia, the use of virtual microscopy in teaching oral pathology for dentistry students were examined. In this method, using a special scanner, actual slides of oral pathology samples could be changed into archival slides and they could be studied virtually by using special software. The results of the study showed that the use of the computer slides has increased the quality of the education considerably compared with the traditional method using a light microscope.¹⁵ Using computer images on dental pathology education led to changing education method from teacher-oriented to student-oriented.¹⁶ Vuchkova et al. also showed that the use of multimedia educational aid software in oral pathology course resulted in improving the education quality and enhancing student understanding compared with traditional methods.¹⁷ A similar result has been reported in comparison of modern and classical education in oral pathology by Szymas.¹⁸

As it could be seen, the results of our study were consistent with results of the mentioned studies. In other words, the new method in teaching oral pathology using multimedia tools can at least be effective in increasing the mean scores of students in this practical course. However, this method of education is new in our country and using the experiences of other countries in this regard would be very helpful. For example, similar experiences in the United States have shown that there is still no comprehensive agreement between the students and the educational staff with the use of modern educational methods in the field of dentistry. In North America 59% of dentistry students still preferred traditional teaching methods, based on the reference textbooks, to the new methods, using computer.¹⁹ The main dissatisfaction of students was related to the disinterest of the faculty members in the use of modern methods of training or poor quality of the software.²⁰ Most dentistry students used new computer methods only to find

their desired material and they did not wish to replace the traditional methods with computerized ones.²¹ Hendricson et al. surveyed computer-based educational programs or E-curriculum in some dental schools in the U.S. The program included a multimedia-based training, online courses, the use of e-mail, etc. Finally, the lack of enough time, lack of skills in using these technologies and lack of incentives for dentistry students and faculty members were reported as the main reasons for the lack of interest.²² Although a large number of dentistry students tended to use modern educational methods, many of the educational staff were not interested in.²³ In Turkey only 14% dentistry students in pathology training course used the related Internet images.²⁴ Regarding what mentioned above, the necessary actions to enhance the efficiency of this new educational method can be summarized as follows:

- Encouraging the students for using of new educational resources
- Encouraging educational staff for valuing new educational methods and devoting at least a part of educational program for it.
- Improving the quality and quantity of educational aids.
- Promoting scientific and practical level of students and staff in the use of new methods such as computer and Internet.
- Promoting educational facilities in dentistry faculties and equipping them with the latest technologies in the fields of computers and the internet.
- And finally, using the new methods, particularly in the field of oral pathology education such as virtual microscopy.²⁵

Conclusion

In comparison of traditional and new methods of teaching practical pathology in the dental department, the new method can help to improve the scores of students using multimedia educational tools, although this difference was not statistically significant between the two groups. Considering the acceptable results of the educational aid tool in the promotion of students' scientific level in Dental Pathology Department, it is recommended to use it. It is also suggested that in future studies, viewpoints of the faculty members and students be collected and applied for improving the quality of educational aid tools. To determine more precisely the role of educational aid tools in promoting scientific level of the students, you can use pre-post studies. Besides, the role of other parameters such as duration and quality of educational aid programs and the level of student interest and compliance should be considered in future studies.

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Ethical Issues

Participants' information was kept confidential.

Competing Interest

The authors declare that there is no conflict of interests.

References

1. Neville BW, Damm DD, Allen CM, Bouquot JE. Oral and maxillofacial pathology. 3rd ed. Philadelphia: Saunders Co; 2009.
2. Statistic and Information Technology Office. [Regulations of general dentistry, approved by the twenty-seventh meeting of the Council for Medical Sciences Planning [internet]]. Iran: Ministry of Health and Medical Education; 2004. Available from: <http://it.behdasht.gov.ir>
3. Alizadeh M. [Medical teachers guide, practical guide for lesson plan]. 1st ed. Iran: Education and Development Center of Tabriz University of Medical Sciences; 2009.
4. Secomb J. A systematic review of peer teaching and learning in clinical education. *J Clin Nurs* 2008;17:703-16.
5. McMillan PJ. Exhibits Facilitate histology laboratory instruction: Student evaluation of learning resource. *Anat Rec* 2001;265:222-7.
6. Qayumi AK, Kurihara Y, Imai M, Pachev G, Seo H, Hoshino Y, et al. Comparison of computer-assisted instruction (CAI) versus traditional textbook methods for training in abdominal examination (Japanese experience). *Med Educ* 2004;38:1080-8.
7. Lehmann HP, Freedman JA, Massad J, Dintzis RZ. An ethnographic controlled study of the use of a computer-based histology atlas during a laboratory course. *J Am Med Inform Assoc* 1999;6:38-52.
8. Afshar A. [Webdesign company in Iran [internet]]. Iran: Irantechnology; 1995. Available from: <http://www.iran-tech.com/fa/news/irantech>
9. Al-Jewair TS, Qutub AF, Malkhassian G, Dempster LJ. A systematic review of computer-assisted learning in endodontics education. *J Dent Educ* 2010;74:601-11.
10. Peterson D, Kaakko T, Smart E, Jorgenson M, Herzog C. Dental students attitudes regarding online education in pediatric dentistry. *J Dent Child (Chic)* 2007;74:10-20.
11. McCann AL, Schneiderman ED, Hinton RJ. E-teaching and learning preferences of dental and dental hygiene students. *J Dent Educ* 2010;74:65-78.
12. Plasschaert AJ, Wilson NH, Cailleteau JG, Verdonschot EH. Opinions and experiences of dental students and faculty concerning computer-assisted learning. *J Dent Educ* 1995;59:1034-40.
13. Nance ET, Lanning SK, Gunsolley JC. Dental anatomy carving computer-assisted instruction program: an assessment of student performance and perceptions. *J Dent Educ* 2009;73(8):972-9.
14. Chew FS, Stiles RS, Joseph E, Whitley MD, Award. Computer-assisted instruction with interactive videodisc versus textbook for teaching radiology. *Acad Radiol* 1994;1:326-31.
15. Farah CS, Maybury T. Implementing digital technology to enhance student learning of pathology. *Eur J Dent Educ* 2009;13:172-8.

16. Farah CS, Maybury TS. The e-evolution of microscopy in dental education. *J Dent Educ* 2009;73:942-9.
17. Vuchkova J, Maybury T, Farah CS. Digital interactive learning of oral radiographic anatomy. *Eur J Dent Educ* 2012;16:e79-87.
18. Szymas J, Lundin M. Five years of experience teaching pathology to dental students using the WebMicroscope. *Diagn Pathol* 2011; 6 Suppl 1:S13.
19. Ditmyer MM, Dye J, Guirguis N, Jamison K, Moody M, Mobley CC, Davenport WD. Electronic vs. traditional textbook use: dental students' perceptions and study habits. *J Dent Educ* 2012; 76:728-38.
20. Hendricson W, Eisenberg E, Guest G, Jones P, Johnson L, Panagakos F, McDonald J, Cintron L. What do dental students think about mandatory laptop programs? *J Dent Educ* 2006; 70:480-99.
21. Brunet DP, Bates ML, Gallo JR 3rd, Strother EA. Incoming dental students' expectations and acceptance of an electronic textbook program. *J Dent Educ* 2011;75:646-52.
22. Hendricson WD, Panagakos F, Eisenberg E, McDonald J, Guest G, Jones P, Johnson L, Cintron L. Electronic curriculum implementation at North American dental schools. *J Dent Educ* 2004;68:1041-57.
23. Gupta B, White DA, Walmsley AD. The attitudes of undergraduate students and staff to the use of electronic learning. *Br Dent J* 2004;196:487-92.
24. Komerik N. Use of the Internet among dental students in Turkey. *J Dent Educ* 2005;69:470-5.
25. Weaker FJ, Herbert DC. Transition of a dental histology course from light to virtual microscopy. *J Dent Educ* 2009;73:1213-21.