Short Communication
A Comparative Study of Multimedia and Conventional Education Methods in Undergraduate Training in Preclinical Endodontics.

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Abstract

Background: There is little systematic research about the efficacy of multimedia-based system for learning in medical sciences. The purpose of this study was to evaluate the efficacy of an interactive multimedia courseware package to demonstrate access cavity preparation for undergraduate dental students in preclinical endodontics course and compare with tutorial method of education.

Methods: This study was performed on 62 undergraduate dental students. The students were randomly assigned in two groups of 31 each. The first group was instructed by interactive system using computer assisted learning (CAL), and the second group was instructed by conventional tutorial sessions in laboratory (Lab). The students' scientific knowledge and overall scores were compared between two groups.

Results: The students' scientific knowledge and retention showed no significant difference between two groups. In addition, students' attitudes were not significantly different between two groups.

Conclusion: CAL software packages has the same efficacy as conventional method in preclinical endodontics course and can be developed in some branches of dentistry.

Key words: Dental education, Endodontics training, interactive multimedia, computer assisted learning, Hypertext, Conventional training.

Many dental educators concerning of facilitating students' acquisition of preclinical dental knowledges and skills and the transfer of these to the patients in clinic. Traditionally, the acquisition of preclinical endodontic skills starts with the demonstration performed by teacher in extracted teeth or in plastic models. This method of instruction is teacher-based learning and seldom appropriate for case-based and problem-based instruction. It only allows discussion of what students do and the environment in which they do it.

To overcome these deficiencies, recent curriculum changes in dental schools have led to the use of computer in teaching and learning in order to improve efficiency of education. The first use of computers as an instruction tool in the dental profession was reported when computer- assisted learning (CAL) was developed as part of dental curriculum at the University of Kentucky[1]. In dental education, new teaching methods to combine audio and visual data in an interactive form have been introduced including both computer-assisted learning[2] and teledentistry[3]. Multimedia is a computer-based learning and an interactive technology that is capable on varying information presentation based on user data input[4]. Interactive systems allow learner not only to learn but also to take greater control on their own learning process[5]. Hypertext is an advanced method of technology in which the selected words

are links to other documents which may be text, figure, film, etc[6].

In 1992, Davis et al produced a computer assisted learning package for the department of restorative dentistry in university of Sheffield, England[7]. In 2003, Aly et al[8] developed an instructional multimedia program for self directed learning in undergraduate and postgraduate training in orthodontic. The result of their study showed that the majority of undergraduate and postgraduate students in this project were very enthusiastic about this form of education.

According to the literature, there is little systemic research about multimedia , thus to evaluate the effectiveness of this new technology, academics may be dual challenge to use the interactive multimedia when there is little information about the ability and effectiveness of this instruction method in teaching and learning.

The objective of this study was to test the effectiveness of an interactive multimedia courseware package in preclinical endodontics training and comparing it with a conventional method of instruction in undergraduate dental education at the school of dentistry, Shiraz University of Medical Sciences, Iran.

Materials and methods

Sixty-two second year dental students, were randomly assigned to two equal groups. The group 1 students divided in 3 subgroups according to the seating places and received demonstration conventionally in the Laboratory (Lab) on the use of extracted teeth for four sessions of 1 Hour each. Students in group 2 also divided in 3 subgroups and received demonstration using computer-assisted learning (CAL) with hypertext system for four sessions of 1 hour each. The students of both groups then continued to prepare access cavity on anterior, premolar, and posterior teeth in upper and lower jaws for four sessions of 3 hours each under same instructor's supervision.

A visual hypertext system was implemented by multimedia builder software version 4.8 using a database of endodontic information including intro screens, principle steps, rules and practical techniques for access cavity preparation on anterior and posterior teeth and common faults which may happen during procedure (figure 1). These documents are in the form of texts, radiographs, charts, figures, and movies associated with demonstrator's voice.

At the end of clinical task, the students of both groups were assessed. the assessments investigated were:

1) 24 multiple choice questions to determine retention of information and scientific knowledge of participants learned during the course;

2) A questionnaire containing 5 statements to evaluate the attitude of the students by choosing either 1: very, 2: average, 3: not very

Q1: How easy do you prepare access cavity in this course?

Q2: How useful do you think regarding the course was to provide necessary knowledge?

Q3: Did you have enough time to see the demonstration in this course?

Q4: How efficient and effective were the subject materials in this course?

Q5: Overall, did this course satisfy you regarding the access cavity preparation?

Final tests were taken to evaluate the retention of information and practical skills; the two group's scores was also compared?

Results

The results of students' scientific knowledge from the final tests showed that the CAL training group scored 76.6% and the conventional training group scored 66%, which were not significantly different. Based on assessing the attitude of the students, which is summarized in Table 1, both educational methods: were easy to use (Q1), were useful to provide necessary knowledges (Q2), had enough time for training (Q3), had sufficient and effective subject materials to study (Q4), and the students were satisfied with the course (Q5).
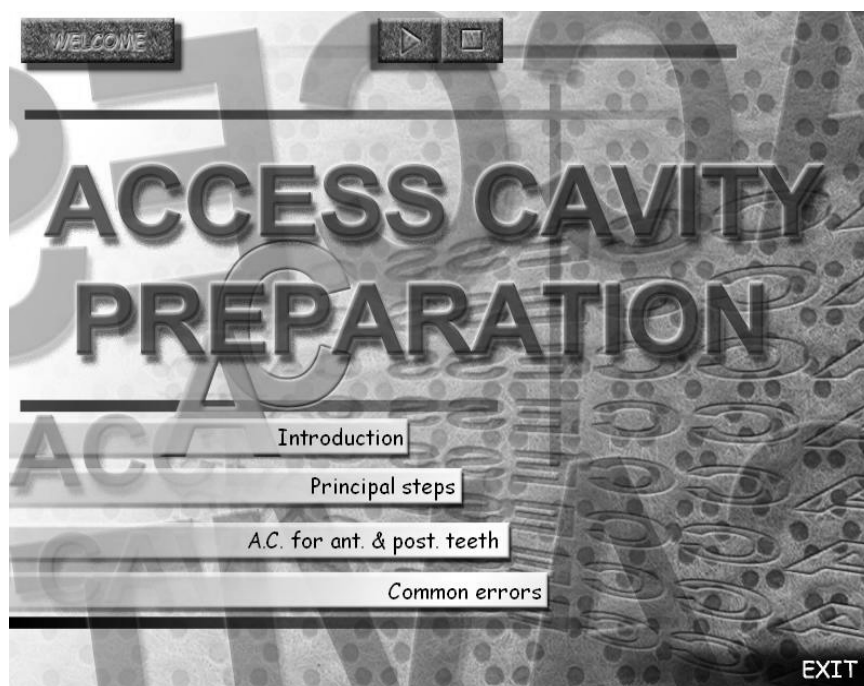
Fig 1. Screen showing index of contents of the main menu. Student can select topics of interest.

Table 1. Students'response taken from the questionnaire to evaluate the student's attitude. Comparison between Interactive Multimedia (CAL) and conventional (Lab) training. Data are n (%).

	CAL			Lab		
	Very	Average	Not very	Very	Average	Not very
Q1:Ease of use	25(81)	6(19)	0(0)	23(75)	8(25)	0(0)
Q2:Usefulness	28(90)	3(10)	0(0)	21(68)	10(32)	0(0)
Q3:Enough time	19(62)	10(32)	2(6)	16(52)	9(29)	6(19)
Q4:Efficient & effective	25(81)	6(19)	0(0)	23(75)	7(22)	1(3)
Q5:Satisfaction	27(88)	3(9)	1(3)	22(72)	8(25)	1(3)

No significant differences are between two groups.

Discussion

Computer-assisted learning is a relatively powerful education tool. This tool combines audio and visual data in the form of interactive multimedia[1]. Some studies performed and showed that CAL is an acceptable method of education and comparable with tutorial method[9, 10] .Aly et al[8], Stephens and Grigg[11] have developed CAL as an instruction method of education in orthodontics. they have found that the majority of the students in their study were enthusiastic of using CAL. This study was designed to use the interactive multimedia system to use for preclinical endodontics training for the undergraduate dental students in Shiraz Dental School, Iran. The findings of this study showed that CAL is comparable with conventional training and was found to be easy and useful (Q1, Q2). Students also seem to be able to study the subject matters efficiently with satisfaction (Q4,

Q5) in interactive multimedia as well as in the conventional methods.

Although the CAL has some limitation such as lack of necessary communication skills and attendance at lecture, but the majority of students in this study were very enthusiastic about this form of educational approach. This study showed that CAL is easy to use (81%), useful to improve knowledge (90%), and efficient for understanding (81%). These results are comparable with the results of an study carried out on the use of multimedia program for training in orthodontics in 2003 by Aly et al[7].

The scores obtained by the students in both groups in theorical and practical retention of information showed that multimedia training method is as understandable as the traditional method (70.6% and 66% respectively).

Although multimedia training would not replace conventional training method but this new technology is a method of self-directed learning with some advantages. Some students may miss to attend the class; this may be negatively reflected in their education. This reflection can be compensated by using interactive multimedia training method. Also, a main policy of each dental school is to create a positive attitude in undergraduate and postgraduate students to undertake self – director learning throughout their professional life, which can be provided by using multimedia-training methods.

Acknowledgment

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