

The Effectiveness of an Oral Pathology Computer- Assisted Learning Program for Dental Students

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ABSTRACT

Statement of the Problem: During the recent years, new methods of teaching and learning have been introduced for medical and dental students in addition to the traditional teaching techniques. Computer assisted learning (CAL) program is one of these methods which seem to have promising results.

Purpose: To compare a computer -assisted learning (CAL) program about oral red and white lesions with a print medium of identical content.

Materials and Method: Fifty senior dental students were randomly assigned in a prospective study to either use the CAL program (n=25) or a pamphlet (n=25). After one week since the educational CDs and pamphlets were distributed, both groups were asked to complete the post-intervention multiple choice questionnaire followed by watching 10 clinical slides on oral red and white lesions for 10 minutes. Chi-square and Mann-Whitney tests were used for data analysis.

Results: Students in the CAL program group scored higher (16.64) than those in the pamphlet group (13.44) and this difference (3.2 points or 28%) was statistically significant ($p < 0.05$).

Conclusion: The difference in test scores was most likely related to the use of the CAL program and it seems to be a promising medium as an adjunct to other traditional tutorial methods.

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Introduction

The ultimate aim of teaching and learning is to produce a creative thinker. The elements of text, sound and image can be used for group teaching, as in lecture theatre presentations, as part of a laboratory course, or for individualized learning where the presentation and manipulation of information is controlled by the participant [1]. Enhancement of learning with computer technologies began in the mid- to late 1960s. [2-3] Computer-assisted learning (CAL) is a

self-instructional program providing an accessible, interactive, and flexible way of presenting curriculum material and has shown promise by introducing interactivity and independence into learning experiences. The literature tracing the historical development of CAL since then is extensive. Several studies have reviewed the broad spectrum of literature in this area [4-5]. A recent article by Rosen-berg et al. [6] has reviewed a large portion of the CAL literature with a particular emphasis on dental education concluding

that CAL is as effective as other methods of teaching and can be used as an adjunct to traditional education or as a means of self-instruction.

The aims of this study were to 1) develop and introduce a self-instructional, computer- aided program and educational pamphlet on oral red and white lesions 2) evaluate the effectiveness of computer-assisted program compared to educational pamphlet in a group of senior dental students.

Materials and Method

A CAL program about oral red and white lesions in the form of CD was developed for this study at dental school of Tehran Islamic Azad University covering areas of clinical description, differential diagnosis and treatment planning having characteristics common to CAL such as self-paced, independent, anytime/ anywhere format; maximum interactivity; intuitive, easy-to-use interface; high-quality graphics; and testing and feedback. An educational pamphlet was developed with an identical content used for CAL program including the clinical pictures.

Fifty senior dental students were assigned in a prospective study to either use the CAL program (n=25) or the pamphlet (n= 25). Both groups were matched for gender, age, computer experience and dental knowledge. All of the students had successfully passed the oral pathology courses in previous terms taught by the same teachers in the same class. Inclusion criteria allowed for both genders and all ages of potential subjects. There were no exclusion criteria, besides unwillingness to participate. Each student in either group used an appropriate medium for 15 minutes under close supervision and all the CDs and pamphlets were then collected by the authors.

One week after the distribution of the educational CDs and pamphlets, both groups were asked to complete the post-intervention multiple choice questionnaire followed by watching 10 clinical slides on oral red and white lesions for 10 minutes (each slide one minute) to measure the effectiveness of CAL program

and pamphlets. The questionnaire was composed of 10 MCQs, each with four choices. Two points were considered for each correct answer. Chi-square and Mann- Whitney tests were used for data analysis.

Results

A total of 50 fifth-year dental students participated in our study. Twenty-five of them were randomly allocated to CAL program group and twenty-five to pamphlet group. Description of the groups is displayed in Table 1. Chi-square analyses, with appropriate grouping, showed no statistically significant differences between the groups in the areas of gender, age, computer experience, or dental knowledge.

Table 1 Description of the study groups

Variable	Group	
	CAL program (n=25)	Educational Pamphlet (n=25)
Female	14	16
Male	11	9
Age (year)		
Below 24	13	12
Between 24 and 27	8	9
Above 27	4	4
Computer Experience		
No Previous Experience	0	0
Familiar	15	13
Very Familiar	10	12
Overall Dental Courses		
Above average	4	5
Below average	21	20

As Table 2 shows, students in the CAL program group scored higher (16.64) than those in the pamphlet group (13.44) and this difference (3.2 points or 28%) was statistically significant ($p < 0.05$).

Table 2 Exam scores for each group: mean Confidence Interval (CI) and standard deviation (SD)

	Group	
	CAL program (n=25)	Educational Pamphlet (n=25)
Mean	16.64	13.44
CI	18.2	21.2
SD	3.3	2.85

Discussion

The current research indicates that computer connected databases and computer assisted learning (CAL) may enhance learning and provide the clinician with information for decision-making when treating patients. CAL also has the potential to help students develop skills and knowledge [7]. In recent years, some studies have evaluated the effectiveness of CAL programs in some areas of dental teaching. The evaluation of different modes of learning in dental education has involved a comparison of outcome measures (such as scores on a multiple choice test) between randomly allocated experimental and control groups [8-10].

The result of our study showed that students in CAL program group performed better than those in the pamphlet group in answering multiple choice questions followed by watching clinical slides and this difference was statistically significant ($p < 0.05$).

Rosenberg et al. assessed the effectiveness of an electronic histology tutorial (EHT) as a mode of learning by comparing performance on two term tests for an EHT class of sixty-nine students and five prior classes. They found that EHT group performed significantly better on both the general histology and oral histology term tests than the five prior control years ($p < 0.001$) who learned by traditional methods [11].

Another similar result has been shown by Thisdale and Shaikh. They tested the efficacy of a CD as an educational tool and found it to be useful ($p < 0.001$), though they did not use any other method of teaching for comparison [12]. In another study, Friedl et al. compared the educational value of a multimedia module about aortic valve replacement as a preparation for the operating room with a print medium of identical content. Regarding factual knowledge, they found no difference between the two groups but the multimedia group needed significantly ($p < 0.001$) less study time (105 ± 24 minutes) when compared with the text group (122 ± 30 minutes) [13].

It is important to notice that data reported in controlled trials of CAL in dental education show

effect-s ranging from none (i.e. no difference between CAL and traditional methods) to significant advantages of CAL over conventional teaching modalities in terms of knowledge gained by the students [11]. In other words, CAL can be considered as equally effective if not better than traditional tutorials.

In this regard, Bogacki tested a computer-assisted learning program designed to teach the anatomy of the adult dentition. The results showed that CAL program was statistically equivalent to the traditional dental anatomy lecture in its ability to teach dental anatomy, as measured by exams ($p < 0.5$) [14]. Tobin has stated that there is no best medium in the process of teaching and learning [15] and despite advances in IT technology it remains true that the teacher is the prime and the exclusive use of computers and videos in higher education has been found not to come up to expectations [16]. So, emphasis is shifting from asking 'which medium is the better teacher'- to the quest for what 'attributes' of various media might combine with learner traits under task conditions and performing demands, to produce different kinds of learning [17].

It is worth mentioning that the attitude of the students toward CAL and other new modes of learning, no matter how well they are designed, might somehow affect the final results in these types of studies. Since students are accustomed to attending traditional lectures and they may value personal interaction with the teachers [18], the concept of replacing conventional lectures in favor of CAL tutorials alone should be considered with caution [10, 14].

We tried to reduce the number of confounding variables as much as we could. Nevertheless, confounding variables are hard to be eliminated totally in these types of studies. It has been argued that rigid quantitative and controlled experimentation cannot be considered valid in an environment where the variables of the subject pool are almost as great as or greater than the pool itself. Furthermore, the blindness involved in randomization becomes corrupted in an educational context since there are rarely placebos in educat-

ion [19]. In this study, all the contents of CAL program and pamphlet on oral red and white lesions were designed to be the same and the students were matched and all of them attended and successfully passed oral pathology courses in previous terms taught by the same teachers and at the same class.

Conclusion

The findings of this study show that CAL program seems to be a promising medium as an adjunct to other traditional tutorial methods. We hope that CAL programs will be developed for other subjects in the future.

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