

## Comparison of the Efficacy of Educational Film and Clinical Demonstration for Instruction of Fiber-Reinforced Composite Post Restorations to Dental Students

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### Abstract

**Objective:** Different educational tools are now commonly used in universities worldwide such as illustrations, audio and videotapes, etc. This study aimed to compare the efficacy of educational film and clinical demonstration for instruction of Fiber-Reinforced Composite (FRC) post restorations to dental students in Department of Restorative Dentistry.

**Methods:** This interventional study was conducted on 70 fifth year dental students in Mashhad University. Students were divided into two groups. Group 1 students watched live demonstration of a treatment procedure (FRC post restoration) while group 2 watched the educational film of the same procedure. Both groups participated in a post-test. Also, students' perspectives were sought via a questionnaire. Data were analyzed using SPSS, Student's t-test and Chi-square test.

**Results:** The mean post-test score of group 2 students (educational film) was greater than that of group 1 students (clinical demonstration) and the difference in this respect between the two groups was statistically significant ( $p=0.008$ ). Considering the score of 7 as an acceptable score, 44 students gained scores 7 or higher; out of which, 16 were in group 1 (clinical demonstration) and 28 were in group 2 (educational film). The difference in this regard between the two groups was statistically significant ( $p=0.003$ ). Most students preferred watching the educational film to the crowded clinical demonstration sessions.

**Conclusion:** Watching the educational film yielded greater test scores than the clinical demonstration.

**Key words:** Audio-Video, Composite, Dental education, Fiber, Prefabricated post, Reinforced.

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### Introduction:

Educational films, illustrations, charts, posters, audiotapes and books are educational tools that can greatly help students in the process of education. Educational films can significantly enhance clinical instruction and provide a suitable learning environment for students.

Clinical instruction is the most important part of dental education curricula because in this step, the students practice their didactic learning. During the clinical courses, the students acquire

the necessary skills for patient management and encounter actual clinical situations. Different instructional techniques are used for clinical education including:

A. *Live clinical demonstration on patients by the instructors:*

This method has several advantages since the students directly watch the procedure being performed on actual patients and can ask questions during the procedure. However, this method has some drawbacks as well. For instance, a good case for demonstration may not

be available at the time, the treatment time for students' practice on patients is decreased, the crowd makes it difficult for all students to fully watch the procedures performed in the posterior areas or on the maxillary teeth and there is a risk of encountering unexpected problems disrupting the course of instruction (1).

*B. Use of advanced technology such as videotapes or computers:*

Educational films have some drawbacks as well including the production cost, requiring technical expertise, time-consuming production process, difficult editing and updating, etc. However, educational movies provide a new learning experience for students (2). Also, these films can be used to display gradual processes like the eruption of teeth. Moreover, the ability to repeat some parts or the entire film is a big advantage. For greater emphasis on some specific details, some parts of the film can be repeated several times (3).

Considering the decreasing ratio of instructors to students in many dental schools worldwide, researchers are attempting to find new instructional methods to improve the quality of medical and dental education while being cost-effective at the same time (4-6).

Clinical practice on actual patients is among the most important parts of dental education. Improving the clinical performance of students greatly depends on the precise observation of the standard phases of treatment.

The efficacy of computer-based instruction, multimedia techniques and videotapes has been extensively studied (7, 8).

In a study comparing live demonstration and watching a videotape of the demonstration in two groups of dental students, it was demonstrated that students were able to more precisely follow the procedure and observe it in greater details when watching the videotape. The only problem was that they did not get to ask questions during the procedure. Students believed that live broadcasting of a treatment

procedure would have the best results. A videoconference with the operator while watching the procedure could also be helpful (9). Use of educational films in the medical fields is highly popular especially for acquiring clinical skills. Studies have demonstrated significant improvements in performance of students after watching instructional films of clinical procedures (10). Literature indicates that proper use of multimedia for instruction of skills can lead to better, more satisfactory learning.

On the other hand, videotaping the students' clinical performance and showing it to them at a later time improved their insight into their own professional performance and clinical work (11). Literature is rich of studies indicating the efficacy of alternative technologies for improving the efficacy of medical education. Although different educational techniques such as educational films have long been used for instruction of clinical practice particularly in dentistry worldwide, not many studies have evaluated the efficacy of this instructional modality in Iran. This study sought to compare the efficacy of educational films and live clinical demonstration for instruction of a clinical skill to dental students.

## **Methods:**

This interventional study was conducted on all fifth year dental students in Mashhad University of Medical Sciences. An educational film regarding the restoration of endodontically treated anterior teeth with fiber-reinforced composite (FRC) post was prepared. The treatment steps were performed by an instructor intra- and extra-orally based on a pre-designed scenario while being video-taped. The understudy subjects included 70 fifth year dental students that were randomly divided into 2 groups of 35. The pre-testing was carried out based on the students' scores of restorative

dentistry course in the previous semester. The mean score of students in the two groups was equal ( $p=0.3$ ).

Group 1 students were divided into 5 groups of 7 and each subgroup watched clinical demonstration of the restoration of an endodontically treated anterior tooth with FRC post. The clinical demonstration was performed at different times for each subgroup. A total of 5 clinical demonstrations were performed for students by a restorative dentist (who also prepared the educational film). Each of the group 2 students ( $n=35$ ) received a copy of the educational film prepared by the same instructor. Data were collected using two methods. First, a post-test including 10 questions was held in the form of a slide show to assess the level of students' learning. The test included related diagnostic and therapeutic questions. The instructors of restorative dentistry believed that the designed questions covered the objectives of clinical instruction. A questionnaire containing 5 two-choice questions was also used to assess the students' perspectives regarding the efficacy of the two educational techniques. The content validity of the post-test and the questionnaire was assessed by the instructors of the restorative dentistry in the university and the necessary

modifications were made.

After the completion of demonstration sessions for group 1 and watching the educational film by group 2, students of both groups were asked to participate in the post-test. Slides were shown and the students wrote down their answers. It must be noted that the answers to questions had been thoroughly discussed in both the clinical demonstration and the educational film. Before administering the questionnaires, students were thoroughly informed about the questions and the topic of the questionnaire. After the test, educational film was shown to all students and the questionnaire was administered among them. After collecting the questionnaires, data were coded and descriptively analyzed using SPSS, Student's t-test and the chi-square test.  $p<0.05$  was considered statistically significant.

**Results:**

The mean post-test score was 7.72 (1.18) in the educational film and 6.86 (1.37) in the clinical demonstration groups (Table 1). The difference in this respect between the two groups was statistically significant ( $p=0.008$ ).

**Table 1- The mean and standard deviation (SD) of the post-test score in the two groups**

Group	Number	mean (SD)	Maximum score	Minimum score
Clinical demonstration	35	6.89 (1.37)	9.5	4.5
Educational film	35	7.72 (1.18)	10	4.5

The restorative dentistry instructors considered the minimum requirements for this skill and set the passing score as 7. Of all students, 44 gained scores of 7 or higher; out of which, 28 (63.6%) belonged to the educational film and 16 (36.4%)

belonged to the clinical demonstration groups (Table 2). The difference between the two groups in obtaining the passing score (7 or higher) was statistically significant ( $p=0.003$ , Table 2).

**Table 2- The frequency distribution of students based on their test score**

Group	Score $\geq 7$ (%)	Score $< 7$	Total (%)
Clinical demonstration	16 (36.36%)	19 (73.07%)	35 (50%)
Educational film	28 (63.64%)	7 (26.93%)	35 (50%)
Total	44 (100%)	26 (100%)	70 (100%)

According to the results of the questionnaire (students' perspectives), most students preferred the educational film because this way they could review the procedural steps over and over (79%) and had a better view of the treatment steps when the field of view was limited (94%). Also, they gave a higher score to educational film in

terms of educational adequacy (64%) and learning the proper order of procedural steps (69%). However, students gave a relatively higher score to clinical demonstration (60%) in terms of the ability to observe the treatment steps more completely (Table 3).

**Table 3- Questions and relative frequencies of the answers**

Questions	Answer	
	Clinical demonstration	Educational film
Which technique allows more complete observation of treatment steps?	60%	40%
Which technique has greater educational adequacy?	36%	64%
Which technique better describes the proper order of procedural steps?	31%	69%
Which technique allows repetition and review of the procedural steps?	21%	79%
Which technique allows better observation of treatment steps when the field of view is limited?	6%	94%

### Discussion:

This study aimed to assess the efficacy of educational film in clinical performance of students and achieving the educational goals. Clinical demonstration aims to provide students with the primary expertise required for diagnosis and treatment planning.

The number of students who gained the passing score and also the mean score of students were higher in the educational film group. However, in a study by Schlueter, *et al.* (2010) educational films were not much effective for oral hygiene instruction to patients. They emphasized the need to revise the educational techniques (12).

The results of two studies in the field of fixed prosthodontics revealed that educational films could significantly enhance learning of students (13, 14); although they may prefer clinical demonstrations (13).

Chen, *et al.* (1998) compared lecture accompanied by slides with an educational video

for teaching proper positioning of orthodontic brackets and reported that the educational video yielded more favorable results (15).

In our study, some students believed that the educational film allowed better observation of treatment steps. Similarly, two studies reported that high-quality educational films demonstrating the clinical procedures in close view significantly improved the performance and clinical skills of students and enhanced real time visualization of clinical procedures (16, 17).

Since the routine form of clinical instruction in our university is clinical demonstration, students in the educational film group were well aware of the advantages and disadvantages of clinical demonstrations they had experienced it many times during their education. Therefore, a clinical demonstration was not carried out for this group of students. Students gave a higher score to the adequacy of the educational content as well as the proper order of procedural steps in

the educational film. This is due to the fact that an educational film is edited before distribution; while mistakes during a live demonstration are inevitable. However, it should also be considered that encountering some unexpected problems during a live clinical demonstration and their proper management by an experienced instructor further adds to the quality of instruction. In a study by Karimi Mooneghi, *et al.* in 2003, the efficacy of traditional demonstration by instructors was found to be higher than that of educational films (18). They compared the efficacy of two instructional techniques for nursing and midwifery students in acquiring skills like washing hands and changing the wound dressing. Thus, students were evaluated in terms of acquiring cognitive and psychomotor skills. It should be noted that despite the greater efficacy of clinical demonstration by an instructor, both groups gained acceptable scores. Also, it should be kept in mind that despite the benefits of films and computer, a successful instruction also depends on the ability of an instructor to create a joyful educational environment. Thus, the efficacy of instruction by educational films should not be over-emphasized (19).

In a study by Odell, *et al.* (2001) the majority of instructors were satisfied with the fact that by preparing the educational films, they spent much less time over instruction of a topic and stated that in educational films and video conferences, topics were discussed more completely and with greater clarity (20). The quality of the film also affects the process of learning; inclusion of special effects in an educational film may enhance learning as well (based on gender) (21). After evaluation of questionnaires, 79% of students mentioned that the repeatability of the educational film was among its main advantages. It significantly improves the students' concentration, efficiency and performance. In clinical demonstrations, tiredness is inevitable due to the crowd and

standing on feet for long hours causing discouragement and loss of concentration. Using educational films, students can better observe the procedural steps in greater details with no time limit and are free to watch it as many times as they wish (5).

Other studies have also mentioned the shortcomings of clinical demonstrations including not being able to completely observe the procedure due to the small size of the oral cavity, differences among patients and treatment conditions and consequently, not being able to match the instructions given to all students (22). Preparation of educational films requires specific equipment. But, a well-prepared high-quality educational film can be more efficacious than clinical demonstration at least in some fields. As stated by Odell, *et al.* (2001), educational films save time and cost (20). They are considered as an important reference source as well since the students can have access to them from almost anywhere outside the university. Monjamed, *et al.* (2006) discussed that considering the shortage of CPR mannequins in nursing schools and hospitals, CPR instruction via an educational film can be an alternative to demonstration on mannequins (23).

Access to educational films from almost anywhere is a big advantage because it can improve clinical practice even years after graduation. Graduates will no longer have access to clinical demonstrations after their graduation. Thus, when encountering a clinical problem, reviewing the taught contents may be of great help.

Despite the fact that in our study, instruction in the clinical demonstration group followed a cluster pattern, there was no need to calculate the variance inflation factor and applying it to the results; because although the instruction was done in 5 groups, the instructor was the same in all of them and followed a pre-designed scenario. All students participated in the same

test afterwards.

### **Conclusion:**

Students who watched the educational film gained higher scores in the post-test. They well accepted this instructional modality. Students prefer this instructional method when ideal conditions for clinical demonstrations are not met (crowding). The authors suggest using this instructional modality in addition to clinical demonstrations. Further studies are required to improve the quality of this method for use in

other fields of dentistry like maxillofacial surgery particularly when the field of view is too small.

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### **Conflict of Interest: “None Declared”**

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