

Perception of the Contribution of Video Demonstrations in Dental Practical Training

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ABSTRACT

Objectives: Information and communication technologies (ICT) have become integral part of our students' daily lives. Their use in practical teaching facilitates the learning process. With the occurrence of the COVID-19 pandemic, demonstration videos were integrated into the pre-clinical practical activities. This work aims to evaluate the students' appreciation of the demonstration videos made for the pre-clinical practical activities (PPA) of the removable partial denture for the students of the 5th semester.

Methods: The Removable Prosthodontics Department professors produced 10-minute didactic video recordings describing the themes of the pre-clinical practice activities. A descriptive cross-sectional study was conducted during the 2021–2022 academic year to assess students' perceptions of the effectiveness and relevance of these videos. Data were collected using an anonymous questionnaire given to student volunteers at the end of the third year (June 2022).

Results: The majority of students favorably appreciated the role of videos in saving time during the session, reducing stress, and better understanding of practical gestures, as well as the average length of videos, the quality of videos in terms of sound, magnification, and the usefulness of text annotations.

Conclusion: Videos allow students to preview the practical gestures several times before the PPA session to better see the demonstration with sufficient magnification and to reduce stress. Both techniques have proven to be effective, and their combination will bring better satisfaction to the students.

Keywords: Direct demonstration, practical activities, students' satisfaction, video.

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1. INTRODUCTION

Today's generation has grown up with technology, which can lead to a disengagement from traditional teaching methods. Skill acquisition focused on traditional instruction only meets the needs of a few learning preferences. Integrating innovative technologies can improve engagement and positively impact student motivation and academic success (Burton, 2022; Thibert, 2014). Theoretical and practical skills are usually acquired through lectures, small group learning, demonstrations, and practical activities. Direct hands-on demonstrations by instructors are often problematic for learners due to limited visual access, especially with the gradual increase in student numbers (Aragon & Zibrowski, 2008; Botelho et al., 2019).

Moreover, due to the COVID-19 pandemic, students and professors were required to follow social distancing norms, which made it even more difficult to visualize the steps correctly. Therefore, new technologies were introduced in the practical classrooms, using instructional videos to continue practical learning while respecting the barrier gestures.

Didactic video recordings describing step-by-step procedures of the different topics of the pre-clinical practical activities (PPA) of cast partial denture (CPD) were made by Professors of the Removable Prosthodontic Department. Textual annotations were integrated into the videos to explain the objectives, introduce the topic, and highlight the general rules to follow to perform the requested procedure. These videos were made available to the students



on the Hassan II University of Casablanca platform and were broadcast in a loop during the PPA sessions. Student acceptance and satisfaction are important measures of educational quality (Rayyan *et al.*, 2017).

This work aimed to evaluate the students' appreciation of the demonstration videos made for the pre-clinical activities of cast partial denture (CPD) to benefit the 5th-semester students.

2. MATERIALS AND METHOD

2.1. Type of Study and Period

A descriptive cross-sectional survey was conducted at the Faculty of Dentistry of Casablanca in June 2022.

2.2. Participants

The survey involved 125 third-year dental students (Semester 5) in the 2021–2022 academic year.

2.3. Data Collection

An anonymous 3-part questionnaire was used for data collection. The purpose of the study and the interest of the students' appreciation in improving the current supports were explained. The questionnaire was given to the students who voluntarily agreed to participate in the survey at the end of the pre-clinical practical activities module of cast partial denture.

The first part concerns the contribution of demonstration videos to practical training. The second part focuses on indicators to evaluate the quality of the videos, while the third part provides suggestions for improving this pedagogical aid. A LIKERT-type scale was used. Data processing was performed anonymously using SPSS software in the epidemiology laboratory of the Faculty of Dental Medicine of Casablanca, Morocco.

3. RESULTS

116 students participated in the survey. Most students are satisfied with the demonstration videos (see Table I). Regarding the viewing of the video before the session of PPA, the majority of the students had a favorable appreciation of the role of the videos in saving time during the session (62.1% completely agreed), reducing stress (56% completely agreed, 35.3% agreed), and a better understanding of the practical gestures (58.6% completely agreed, 37.9% agreed). 59 students (50.9%) completely agreed, and 49 (42.4%) agreed on the usefulness of looping the videos on the screens during the PPA sessions (see Table II).

Students were also positive about the average length of the videos (28.4% strongly agreed, 58.6% agreed), the quality of the videos in terms of sound quality (22.4% strongly agreed, 51.7% agreed), the magnification (26.7% strongly agreed, 44% agreed), and the usefulness of the textual annotations in addition to the oral comments (53.4% strongly agreed, 34.5% agreed; see Table III). 83.6% of students preferred to see the demonstration video followed by the live demonstration (see Table IV).

TABLE I: THE DEGREE OF STUDENT SATISFACTION WITH THE DEMONSTRATION VIDEOS

On a scale of 0 to 5, how satisfied are you with the demonstration videos as an educational aid for CPD PPAs?	N	%
0	0	0
1	0	0
2	1	0.9
3	13	11.2
4	67	57.8
5	35	30.2

Among the suggestions of some students who had responded to this part of the questionnaire, the following sentences were retained:

1. Combine live and video demonstrations,
2. Improve the shooting angle,
3. Sharing on YouTube will allow us to view the videos in slow motion or fast motion and save them,
4. Add more text annotation for a better understanding of the information,
5. Videos are clearer after a direct demonstration.

4. DISCUSSION

In teaching pre-clinical practical activities, direct face-to-face demonstration is the most common traditional method of training dental students. It increases students' confidence, improves communication skills, and leads to a better understanding of procedures (Alqahtani *et al.*, 2015; Al-Zain & Al-Osaimi, 2021; Iqbal *et al.*, 2022; Kumaresan *et al.*, 2015; Thilakumara *et al.*, 2018). However, several factors may limit its effectiveness, such as low teacher-student ratio, time constraints, students' dependence on the instructor, slight variations in techniques between different instructors, and the speed of the demonstration (Al-Zain & Al-Osaimi, 2021; Iqbal *et al.*, 2022; Kon *et al.*, 2015; Takenouchi *et al.*, 2020). The main disadvantage of direct demonstration is the limited visual access. Therefore, they cannot see all procedures without interruption from start to finish and may miss some important steps, which can cause anxiety and stress (Iqbal *et al.*, 2022; Thilakumara *et al.*, 2018). The live demonstration is presented only once. As a result, students may not have the opportunity to review the steps repeatedly to understand and master the essential skills (Iqbal *et al.*, 2022).

During the COVID-19 pandemic, the integration of videos was necessary to avoid contamination by students gathering around the teacher during direct demonstrations. The video provides knowledge or concepts visually clear and structured, thus covering a wide range of learning preferences (Botelho *et al.*, 2019). By receiving corresponding visual and verbal inputs simultaneously, and due to the possibility of repetition, the load on the student's working memory can be minimized, allowing them to select relevant information and build connections for knowledge transfer (Chuang *et al.*, 2018; Kon *et al.*, 2015).

TABLE II: THE USEFULNESS OF VIEWING THE DEMONSTRATION VIDEOS BEFORE AND DURING THE PPA SESSION

Item	Completely agree	Agree	Neutral	Disagree	Completely disagree
Viewing the videos before the PPA session will prepare you for the session.	82 (70.7%)	32 (27.6%)	2 (1.7%)	0 (0%)	0 (0%)
Viewing the videos before the PPA session will give you more time for practical application.	72 (62.1%)	37 (31.9%)	5 (4.3%)	2 (1.7%)	0 (0%)
Viewing the video before the PPA session reduces stress levels.	65 (56%)	41 (35.3%)	9 (7.8%)	1 (0.9%)	0 (0%)
The videos make the gestures easier to understand to achieve the requested step.	68 (58.6%)	44 (37.9%)	3 (2.6%)	1 (0.9%)	0 (0%)
Playing the videos on a loop on the PPA room screens is useful.	59 (50.9%)	49 (42.2%)	6 (5.2%)	2 (1.7%)	0 (0%)
Viewing the demonstration on the video allows you to be more attentive.	36 (31.0%)	50 (43.1%)	26 (22.4%)	3 (2.6%)	1 (0.9%)

Note: The values in the table refer to the mean (proportion).

TABLE III: VIDEO QUALITY ASSESSMENT INDICATORS

Item	Completely agree	Agree	Neutral	Disagree	Completely disagree
The average length of the videos (~10 minutes) is correct.	33 (28.4%)	68 (58.6%)	11 (9.5%)	3 (2.6%)	1 (0.9%)
The professor's voice is clear.	26 (22.4%)	60 (51.7%)	22 (19%)	6 (5.2%)	2 (1.7%)
The quality of the video is sufficient to see the different procedures.	23 (19.8%)	61 (52.6%)	24 (20.7%)	8 (6.9%)	0 (0%)
The angle of shooting is excellent.	18 (15.5%)	46 (39.7%)	44 (37.9%)	7 (6%)	1 (0.9%)
The magnification used in the videos is interesting.	31 (26.7%)	51 (44%)	27 (23.3%)	3 (2.6%)	4 (3.4%)
Adding textual annotations to oral comments is useful.	62 (53.4%)	40 (34.5%)	9 (7.8%)	3 (2.6%)	2 (1.7%)

TABLE IV: STUDENT PREFERENCES FOR DEMONSTRATION IN THE PPA CLASSROOM

What are your preferences for instructional tools used to improve your practical learning?	N	%
I prefer the video demonstration only.	1	0.9
I prefer the live demonstration only.	4	3.4
I prefer to see the demonstration video followed by the live demonstration.	97	83.6
I prefer to see the demo video and have demo models that can be handled directly without a live demonstration.	14	12.1
Total	116	100.0

Online accessibility allows the student to review seemingly complicated procedures several times, increasing the chances of deeper learning. Using instructional videos helps improve students' confidence, motivation, satisfaction and concentration levels, and thus their performance. It also helps to compensate for teacher shortages and can be a way to calibrate the teaching staff and standardize the teaching content (Alqahtani *et al.*, 2015; Al-Zain & Al-Osaimi, 2021; Botelho *et al.*, 2019; Chuang *et al.*, 2018; Iqbal *et al.*, 2022).

Several studies have assessed student perceptions of instructional videos. Iqbal *et al.* (2022) and Thilakumara *et al.* (2018) found that students consider videos a better teaching methodology than live demonstrations. Kon *et al.* (2015) also reported that 70.3%–91.5% of the students expressed favorable opinions about the video

learning experience, finding it enjoyable, informative, useful, and research-inducing. Students can watch the videos as much as needed, memorize the steps of the procedures, take notes on the important parts, and interact more with their instructors. The traditional method takes more time, which prevents them from completing their task on time. The use of video means more efficient use of session time. (Al-Zain & Al-Osaimi, 2021; Rayyan *et al.*, 2017). Moreover, most of the students who participated in our study (62.1% completely agree, 31.9% agree) found that viewing videos before the PPA session saves them more time during the practical realization. 56% of the students completely agreed, and 35.3% agreed that watching the video before the PPA session helps reduce stress levels. It was also reported by Botelho *et al.* (2019) that easy access to video helps students prepare and, therefore, reduces anxiety.

In our study, the videos provided a better understanding of the gestures to perform the requested step for most students (58.6% completely agreed, 37.9% agreed). Our results are in line with those of Rayyan *et al.* (2017), who stated that the majority of students either agreed (46%) or strongly agreed (41%) that viewing the video before the session facilitated the performance of the requested procedure. Gorucu-Coskuner *et al.* (2020) also showed in their study that stopping the video and resuming it improved understanding of key points.

The duration of each video must be short so that it can be delivered smoothly on any device and platform (Takenouchi *et al.*, 2020). In the study conducted by Abd-Shukor *et al.* (2021), the students suggested reducing

the speed of the video and shortening the duration, which lasted 31 minutes. The duration of the videos evaluated in our study varied between 5 and 10 minutes, and that of the study by [Kon et al. \(2015\)](#) was between 3 and 4 minutes. It was appropriate for the majority of students in the results of both studies.

According to [Al-Zain and Al-Osaimi \(2021\)](#), most of the students' comments regarding the video were related to the clarity and close-up view that helped them understand and see the technique from different angles. These results are consistent with those of our study, where the majority of students had a favorable opinion regarding the quality of the videos (52.6% agreed, 19.8% strongly agreed) and of their magnification (26.7% agreed, 44% strongly agreed). [Wong et al. \(2019\)](#), [Botelho et al. \(2019\)](#), and [Aragon and Zibrowski \(2008\)](#) reported that students find videos useful in preparing for written and practical assessments.

The study by [Thilakumara et al. \(2018\)](#) showed that demonstration videos improve students' knowledge but have no effect on developing practical skills. The results of the [Aragon and Zibrowski \(2008\)](#) study indicated that students who viewed the video performed significantly better on a practical exam compared to students who took the course without video. [Alqahtani et al. \(2015\)](#) showed a similar level of practical skill gained by the group that attended the direct demonstration and the group that watched the video. A carefully designed demonstration video is as effective as a direct demonstration.

Regarding the addition of text annotations in addition to oral comments to videos, most students in our study (53.4% strongly agreed, 34.5% agreed) find it useful. Many studies find a positive effect of subtitles on learning. However, another set of studies shows that they can also hinder learning ([van der Zee et al., 2017](#)). Subtitles can reinforce the verbal message and allow better comprehension of information due to the alternation or simultaneity of visual and auditory pathways ([Kon et al., 2015](#)).

[Abd-Shukor et al. \(2021\)](#) showed that students' retention of short-term theoretical knowledge is improved by associating subtitles with the presenters' voices. However, their practical skills were minimally affected. Regarding students' perception, 66% of respondents found that including summary text pages helped them visualize key points. For [Wong et al. \(2019\)](#), with subtitles, video promotes visual and auditory learning. A video that contains three different sources of information (verbal, subtitles, and text) is likely to induce cognitive overload. Subtitles can be detrimental to learning when a video already has high visual and textual information complexity. However, when this information complexity is relatively low, adding subtitles can be beneficial ([van der Zee et al., 2017](#)).

Students view the videos either on their cell phone or computer. Findings from the study by [Chuang et al. \(2018\)](#) showed that the demonstration video viewed via Smartphones was significantly more effective for students' theoretical and practical knowledge than those of students who could not access the video via their Smartphones. Learning from this media type offers students much flexibility ([Chuang et al., 2018](#)). Young people like to watch videos on YouTube and prefer to use Smartphones rather

than computers ([Takenouchi et al., 2020](#)). The current literature evaluates YouTube as an educational tool. In [Burton \(2022\)](#) study, all respondents (100%) indicated that YouTube videos enhance their learning. Students prefer YouTube videos when learning new skills. Among the proposals from students in our study, we noted the creation of a YouTube channel on which videos of all PPA sessions will be posted. In the study of [Seo et al. \(2018\)](#), students stated that the YouTube platform has the advantage of allowing them to watch a huge amount of data for free (76.8%) and that YouTube's features such as replay, feedback through comments, and subtitles make it easier for them to understand. However, because of its free access and non-peer-reviewed content, YouTube contains some very good material for health care education, but also potentially a lot of misinformation or inaccuracies ([Grillon & Yeung, 2022](#)).

Among the live demonstration techniques reported in the literature is using a desktop-mounted video camera to film a step and simultaneously show it to students ([Rayyan et al., 2017](#)). [Gorucu-Coskuner et al. \(2020\)](#) compared the effectiveness of live video and pre-recorded video demonstrations and concluded that both techniques have a comparable effect on increasing students' knowledge levels. Its limitation remains that it gives the student only one opportunity to view the demonstration ([Rayyan et al., 2017](#)).

Each method, direct demonstration or video demonstration, has its advantages and limitations, so both should be considered in teaching to meet the different learning preferences of students ([Alqahtani et al., 2015](#)). Several studies have shown that live demonstrations are as effective as video demonstrations in imparting knowledge and skills to students. However, live demonstrations cannot be re-watched, and videos alone were less effective than live instruction ([Botelho et al., 2019](#); [Färber et al., 2022](#); [Kon et al., 2015](#)). Videos help clarify points of confusion after live demonstrations and prepare students for the session ([Kon et al., 2015](#)). In the study by [Rayyan et al. \(2017\)](#), students who preferred live demonstrations reported that they could more clearly see the instructor's grip and stance, better visualize the procedure, and interact with the instructor. Students' main comments on the live demonstration reported in the study by [Al-Zain and Al-Osaimi \(2021\)](#) were that the method was useful, they could get answers to their questions, and the instructor immediately clarified difficult problems. Depending on students' learning preferences, some prefer direct demonstration, others prefer videos, and others prefer both methods because they complement each other. [Alqahtani et al. \(2015\)](#) showed that although students preferred video demonstrations, they were reluctant to replace them with live demonstrations. [Kon et al. \(2015\)](#) reported that 97.9% of students thought these videos should not replace clinical demonstrations. The results of [Färber et al. \(2022\)](#) show an improvement in the performance of students who view the videos in addition to the traditional learning method. In their study, [Iqbal et al. \(2022\)](#) also stated that participants who were taught using videos combined with traditional teaching strategies demonstrated a higher level of learning

and proficiency than participants who used only traditional teaching strategies.

Our results are consistent with what has been reported by similar studies. Most students (83.6%) prefer to see the demonstration video followed by the live demonstration. Educational videos can only be used as supplemental tools, not as alternative tools for the learning process. Among the limitations of online learning tools is the lack of visualization of complications and the lack of interaction with the instructor, whereas the live demonstration allows for better student engagement and interaction with the instructor through eye contact and verbal exchange of information (Gorucu-Coskuner et al., 2020; Iqbal et al., 2022; Kon et al., 2015).

The limitation of this study is that only the students' appreciation of videos was assessed, and that practical performance and knowledge levels were not measured. In general, the students had a positive assessment of the videos made. Student evaluation of the recorded videos is valuable. Strengths will be reinforced.

Recommendations can be made to improve the current materials, such as improving the camera angle, using the YouTube platform, adding more text annotation in the form of a summary at the end of the videos, integrating an evaluation in the form of two to three questions at the end of each video. In the future, research should focus on students' competence levels after viewing the videos in pre-clinical activities sessions.

5. CONCLUSION

Teaching aids in the form of demonstration videos were integrated into the PPAs of CPD. An evaluation of the student's appreciation of these materials was conducted. The results showed that the students had a very positive opinion. The videos allow students to preview the practical procedures several times before the PPA session, know the objectives, see the demonstration better through sufficient magnification, and reduce stress. However, the complexity of the visual and textual information in educational videos should not be too high to not impede the learning process. Direct demonstration and video have proven to be effective, and their combination will meet different learning preferences.

AUTHOR CONTRIBUTIONS

YC, KK, SC, and SB supervised the study and contributed to its design and execution. KE designed and directed the research, collected the data, and wrote the manuscript's first, second and final versions. ZA contributed to its design and conducted the biostatistical analysis and interpretation of the results. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

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