

# Using Concept Videos to Teach Predoctoral Dental Students About Intraoral and Extraoral Photography

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## Abstract

**Introduction:** Clinical photography in dentistry has become a vital part of dental education and clinical practice. Dental students seek demonstrations that help them visualize and understand new concepts and clinical procedures. Few multimedia resources are available that provide instruction regarding clinical photography for dental students. The concept videos serve as adjunctive teaching tools for predoctoral dental students in taking clinical photographs. **Methods:** I created the three concept videos on intraoral and extraoral photography by recording narrated PowerPoint slideshows. After sessions on basic photography concepts and digital camera operation, I used concept videos to show how to take comprehensive quality dental photographs in a step-by-step manner and to demonstrate positions of an operator and a patient. I collected feedback using an electronic survey sent to all 33 third-year dental students who participated. **Results:** Eleven students completed the survey; all students responded favorably to this method of instruction. Individual comments were also positive on helpfulness, conciseness, and applicability. **Discussion:** These concept videos were shown to be a helpful resource for dental students in enhancing their knowledge and skills in obtaining dental photographs. Multimedia resources that helped provide students with practical tips and suggestions could supplement clinical chair-side teaching with faculty and further advance their knowledge and skills. Future studies could include more interactive platforms for better student utilization of the resource, and also compare students' performance before and after watching the videos.

## Keywords

Dentistry, Dental Education, Dental Photography, Photography, Clinical/Procedural Skills Training, Concept Video, Multimedia, Prosthodontics

## Educational Objectives

By the end of this activity, learners will be able to:

1. List the armamentarium needed in taking dental photography.
2. Describe the importance of taking quality extraoral and intraoral photographs for documentation and analysis.
3. Demonstrate the proper techniques and positions involved in taking extraoral and intraoral photographs for comprehensive 360-degree view of the entire dentition, and intraoral photographs for static and dynamic movement of the jaw.
4. Assess and troubleshoot issues that arise while taking dental photographs.

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## Introduction

Clinical photography in dentistry has become a vital part of dental education and clinical practice. In the current digital era, the ability to capture and share digital images transformed the way we communicate and led to an increase in the use of electronic media in clinical care and education.<sup>1</sup> Students, educators, and clinicians are used to viewing high-quality images and videos, thus the demand has increased for quality medical and dental images.<sup>2</sup> However, educating dental students on techniques involved in taking quality clinical photographs have been overlooked, as the emphasis of the clinical curriculum is on specific clinical treatment procedures such as cavity and crown preparation. It is important for educators to recognize the importance of and train dental students in taking quality clinical photographs for documentation, patient education, case discussion, and presentation to showcase their work.

Dental students often seek visual aids and demonstrations when learning to visualize and understand new concepts and

clinical procedures. Educational tools utilizing multimedia are increasingly used in place of conventional teaching pedagogies.<sup>3</sup> It has been shown that dental students prefer a multimodal method of learning<sup>4</sup> and incorporating videos into clinical instruction makes it more interesting and helpful for them.<sup>5</sup> I created these instructional concept videos in response to former students' suggestions for more audiovisual teaching demonstrations in taking clinical photographs of dental patients.

The target audience of these videos was the second- and third-year predoctoral dental students who have started their clinical comprehensive patient care and their faculty. Three concept videos were created to help the students understand the armamentarium needed in taking dental photographs and recognize the importance of taking quality extraoral and intraoral photographs for documentation and analysis purposes. Detailed step-by-step videos have demonstrated the proper techniques and patient and provider positions involved in taking extraoral photographs, intraoral photographs for comprehensive 360-degree view of the entire dentition, and intraoral photographs for static and dynamic movement of the jaw. The videos allowed the students to self-assess and troubleshoot issues that occurred while taking dental photographs.

Few resources are available that provide instruction regarding dental photography for dental students. Some institutions may provide some form of reading material or slide presentation on this topic but lack multimedia resources that students can utilize on their own time. This publication provides a unique contribution to dental education, as it included a novel step-by-step approach demonstrating exact positions of the patient, clinician, and assistant to produce intraoral and extraoral photographs of a dental patient. Students can review the videos before each photography session with their patients, or project it on a screen to help guide exact positions and setting while taking photographs. If the school decides to add a hands-on teaching session after students view these videos, this resource could also serve as a guide for faculty calibration and instruction prior to the teaching sessions.

Despite its importance and usefulness to the students and faculty, I did not find any similar publications directly related with educating predoctoral students on dental photography in a multimedia format focusing on teaching the techniques. In *MedEdPORTAL*, there were a few publications that showcased the helpfulness of video aids in teaching dental students on specific clinical procedures.<sup>6-13</sup>

## Methods

### Development

I created the three concept videos on dental photography by recording narrated PowerPoint slideshows. I first identified sets of photographs that were recommended for case presentations and divided them into three main categories: (1) 360-degree intraoral photographs, (2) dynamic movement intraoral photographs, and (3) extraoral photographs. I then outlined the contents of each video and made draft presentations and identified necessary photographs to take. With student volunteers as the patient, the assistant, and the additional photographer, I obtained the necessary photographs. I then wrote the narratives for each slide for three presentations and recorded a slideshow with my narration. I also used a stylus on a tablet computer that allowed me to write in or highlight certain part of the slide content during the slideshow. Once I had the completed videos, I used the Mediasite website (Harvard Medical School), which is an online video portal that is available to Harvard Medical School and Harvard School of Dental Medicine communities, to upload the videos and to create links for the videos.

Prior to viewing the videos, students needed to have prerequisite knowledge on basic dental anatomy, principles of jaw movement and occlusion, clinical chair operation, infection control, personal protective equipment, taking medical history, basic dental photography using a digital single lens reflex (SLR) camera (Appendix A), and an experience in working with a chair-side dental assistant.

Students had also had the introductory dental photography lecture and a group hands-on clinical session with faculty in learning basics of operating a digital SLR camera in taking photographs in a dental chair. To encourage our students in obtaining quality digital photographs as part of patient record documentation and case presentation, Harvard School of Dental Medicine's Office of Dental Education previously purchased four sets of digital SLR cameras, macro lenses, and ring flashes for students to check out to take clinical photographs (equivalent to one camera per 10 students in each clinic session). We also provided an LED light background for extraoral photographs. Students had their own occlusal and lateral mirrors and cheek retractors purchased in the beginning of their clinical year, which could be sterilized before each photography session. Students also purchased their own memory cards for storing digital images.

I created these videos (Appendices B-D) as supplemental resources to further their knowledge and skills in taking more

advanced and comprehensive dental photographs, and to answer some of the questions and comments that came up during the hands-on session.

#### Content and Length of Each Concept Video

*Video 1—How to take extraoral photographs (Appendix B; 5:01 minutes):* This video explained the purpose of taking extraoral photographs, camera and stage settings, as well as dos and don'ts when taking extraoral photographs. The video showed examples of full-face photos (frontal rest, smile, lateral rest, smile) and close-up photos (repose, natural smile, and posed smile).

*Video 2—How to take 360-degree intraoral photographs (Appendix C; 8:38 minutes):* This video reviewed the purpose of taking a 360-degree view of dentition, items needed, camera settings, safety for patient and clinician while taking these photographs, and the suggested order of taking 360-degree intraoral photographs. Then, the video demonstrated how each photograph was taken by showing the positions of the clinician, the assistant, and the patient, as well as the resulting photographs. The photos illustrated in this video included frontal views (closed, open, maxilla only, mandible only); left buccal views (maximum intercuspation, maxilla only, mandible only); right lingual views (maxilla only and mandible only); right buccal views (maximum intercuspation, maxilla only, mandible only); left lingual views (maxilla only and mandible only); mandibular occlusal views (anterior, full); and maxillary occlusal views (anterior, full).

*Video 3—How to take dynamic movement intraoral photographs (Appendix D; 5:08 minutes):* This video described the purpose of taking dynamic movement intraoral photographs, items needed, camera settings, safety for patient and clinician while taking these photographs, and a suggested order of taking static and dynamic movement intraoral photographs. Then, it demonstrated how to practice dynamic movement with a patient by showing a video taken chair-side. Lastly, the video demonstrated how each photograph was taken by showing the positions of the clinician, the assistant, and the patient as well as resulting photographs. The photos illustrated in this video included frontal views (maximum intercuspation, protrusive, right excursive, left excursive); left buccal views (maximum intercuspation, protrusive, right excursive, left excursive); right buccal views (maximum intercuspation, protrusive, right excursive, left excursive).

#### Implementation

I implemented these three concept videos at the beginning of the third-year predoctoral dental student curriculum when they started seeing their comprehensive care patients and taking

preoperative records. I sent an email to all third-year students with the links to the videos to introduce the resources that would help them take clinical photographs as a part of regular patient documentation as well as for their third-year case presentation course cases. The third-year case presentation course was a portfolio-based course that occurred at the end of the third year of dental school when students presented their clinical patient case in front of their classmates, advanced graduate residents, and faculty from various specialties to assess the student's global clinical competency. For this course, students needed to obtain quality clinical photographs for their presentations. Three months before the course started, I gave a lecture to the students regarding the course logistics, requirements, and resources, and I encouraged the students again to view the videos. I did not mandate the students to view the videos or play the videos during the class time as the students expressed that they preferred to view the videos on their own time. Any follow-up questions and comments regarding the videos were directed to me and I modified the videos based on students' feedback. For example, based on a student comment, the volume of one of the videos was reduced. For easier utilization in the clinic setting, the information included in these videos could be presented as reference sheets (Appendices E-G).

To gain student feedback on this resource, I created an electronic survey using Qualtrics. This five-question survey (Appendix H) used a Likert scale (1 = *strongly disagree*, 5 = *strongly agree*) to assess students' thoughts about the instructional methods and asked for comments. A link to the survey was sent to 33 third-year students upon them viewing the videos. The study protocol was reviewed and determined as "not human subjects research" by the Harvard Medical School-Harvard School of Dental Medicine Institutional Review Board, and considered exempt.

#### Results

Among 33 students who were instructed to view the videos, 11 responded to the survey (33% response rate). Respondents were strongly in favor of the concept videos (Table). Students agreed strongly (91%) that the videos both increased their knowledge in taking dental photographs and provided practical tips and techniques that they can use in the clinical setting. All students found that the videos have increased their confidence level in taking dental photographs, and among them 36% strongly agreed that the videos increased their confidence. All students found that the videos were at an appropriate level of difficulty for them, and among them 73% strongly agreed that it was appropriate level for third-year dental students. All

Table. Survey Responses From Third-year Dental Students (N = 11)

Question	No. (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The videos have increased my knowledge in taking intraoral and extraoral photographs.	10 (91)	1 (9)	0 (0)	0 (0)	0 (0)
The videos have increased my confidence level in taking intraoral and extraoral photographs.	4 (36)	7 (64)	0 (0)	0 (0)	0 (0)
The videos have provided practical tips and techniques that I can use in the clinical setting.	10 (91)	1 (9)	0 (0)	0 (0)	0 (0)
The videos were at an appropriate level of difficulty.	8 (73)	3 (27)	0 (0)	0 (0)	0 (0)
I would like more educational videos like these in the future.	10 (91)	1 (9)	0 (0)	0 (0)	0 (0)

students (100%) strongly agree or agreed that they wanted more educational videos like this in the future.

Anonymous evaluations on the concept videos consistently contained students' positive feedback and comments to this method of instruction. Students commented on the practical aspect of the concept videos that they could apply in their clinical setting immediately. Examples of student comments are as follows:

- “The videos had great practical tips that I can use in the clinic. Photos showing the positions when taking photos were especially helpful.”
- “These videos are extremely helpful! I'm absolutely going to use the tips that Dr. Kim shared in my clinical photos moving forward.”
- “It was helpful to have the suggested photo sequence for help organizing how to take all of the photos in a systemic fashion.”
- “Tips about how to get patients into the correct positions (for excursive movements, repose, and smiling) were very helpful. I've definitely already encountered issues in the clinic communicating with patients about positioning so will be using these tips already!”

Some students also commented on the concise nature of the videos that focused on the demonstration of practical techniques, which will allow them to revisit these concepts easily. Examples of such comments include the following:

- “The videos were appropriate in length and very useful in content!”
- “The concept videos are to the point, ‘high-yield,’ and will be a valuable tool to revisit from time to time.”
- “The talking speed was perfect: very clear—not too fast or too slow. The video was distinct and ‘high-yield,’ excluding extraneous information while including sufficient detail to help us grasp the concept and apply it in clinic.”

Students commented on the helpfulness of these concept videos in their learning and suggested that they

would like to see similar videos for other contents in the future:

- “I understand making quality concept videos like these are very time consuming; however, I hope over the years you and other faculty can release more.”
- “A collection of videos like these would be very helpful for dental students.”
- “Each video is great and will be an excellent addition to student learning.”
- “Having videos in a similar style to the series you made gives students enough working knowledge to apply the material and ask thoughtful questions before even reaching the classroom. Moreover, it gives them the opportunity to revisit the materiel as needed.”

### Discussion

To provide practical, succinct, yet comprehensive instruction of dental photography, I created these three concept videos. These videos were shown to be a helpful resource for dental students in enhancing their knowledge and skills in obtaining extraoral and intraoral photographs. From the survey outcomes, it became evident that students appreciated the practical aspect of the concept videos that they can apply in their clinical setting immediately. As novice clinicians, dental students constantly seek ways to improve their skills while seeing patients in the clinic. Multimedia resources that help provide students with practical tips and suggestions could supplement clinical chair-side teaching with faculty and further advance their knowledge and skills. Students also complimented the fact that the concept videos were short in length and concise in delivering the necessary contents. This succinct nature of the concept videos helped keep the students' attention and also encouraged them to watch again when they needed to refresh their memories for upcoming dental photography appointments with their patients.

One of the main limitations for this study was the low response rate (33%). I informed the students about the videos via an email and the class announcement during a lecture and encouraged them to view. I conducted the survey via an email invitation to

33 third-year dental students. One of the possible reasons for the low survey response rate was that the videos were optional for students to view. Some students might not have seen the videos, thus did not fill out the survey. These videos were available to students to view on their own time, which provided convenience to students without using a designated class time to view them. Therefore, I was not able to confirm whether all students had watched the videos and utilized the contents in their clinical experience. In order to ensure that every student watches the videos, the facilitator could choose to view the videos during class time or make them mandatory to view. Another possible reason for low survey response rate was the fact that students were reluctant to fill out online surveys. During the academic year, students often received many survey requests regarding courses, research projects, or school experience. Therefore, some students who had viewed the videos might have been reluctant to fill out the survey, especially because it was voluntary for them to complete.

Another limitation of the study was that it did not evaluate whether it ultimately resulted in students taking better quality photographs after viewing these videos. The survey questions focused on the students' own perception on improvement in knowledge and confidence in taking dental photographs. Future studies could explore how watching the concept videos would result in taking better photographs by comparing the students' photographs before and after watching the videos. Furthermore, the narrated lecture format of the current concept videos might not be the most effective format for student learning, as students might prefer an interactive platform with a motion video or a clickable resource that they could quickly search the very information they need.

I initially thought that in order to develop educational concept videos, I would need to have significant audiovisual support and equipment. It turned out that it was much more manageable on my own than I anticipated. These videos satisfied the students' increased desire for visual aids and demonstrations using multimedia while not being too technically complex to produce, and supplemented a hands-on session to further their knowledge and skills. As noted from the survey results, students clearly wanted more videos like this to supplement their predoctoral learning, thus faculty were encouraged to explore opportunities to incorporate such videos as part of their teaching tools.

This resource could be used as a sole or supplemental educational material to provide clinical instruction on taking dental photographs for predoctoral students during their clinical

years. These videos could be inserted as a part of lecture slides on related topics, such as fundamental principles on dental photography (Appendix A). The facilitator could also choose to supplement the videos with hands-on clinical sessions that allow students to practice the technique. Furthermore, these videos could also serve as a calibration tool for faculty in teaching clinical photographs.

In the future, I would like more student involvement to identify which contents and formats would be most helpful and conducive to their education. In terms of evaluation, in addition to students' own perception on improvement, in the future I would also include measurable outcomes that would assess the effectiveness of the concept videos.

## Appendices

- A. Dental Photography.pptx
- B. How to Take Extraoral Photographs.mp4
- C. How to Take 360 Intraoral Photographs.mp4
- D. How to Take Dynamic Intraoral Photographs.mp4
- E. Clinical Reference - Extraoral Photographs.docx
- F. Clinical Reference - 360 Intraoral Photographs.docx
- G. Clinical Reference - Dynamic Photographs.docx
- H. Dental Photography Concept Video Survey.docx

*All appendices are peer reviewed as integral parts of the Original Publication.*

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## Informed Consent

All the photographs used in the appendices are original and not copyrighted photographs. Due to the nature of the educational content—which is to demonstrate how to take photographs of the face—the subjects' full photos were included in the videos, lecture slides, and clinical references. Subjects who were featured in the photographs provided full consent to be used in an educational context.

### Ethical Approval

The Harvard Medical School-Harvard School of Dental Medicine Institutional Review Board approved this study.

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