

Mixed-methods analysis of videoed expert-student dialogue supporting clinical competence assessments

Abstract

Introduction: This mixed methods study evaluates [the use and perceptions of](#) a novel video genre of authentic, in-the-moment expert-student dialogue to support student preparation for a summative clinical competence assessment.

Methods: Expert-student dialogue videos were available on the university learning management system (Moodle) for self-directed access for a fixed prosthodontics course. These comprised 3 categories of video relating to dialogic [episodes of previous student's performance relating to a](#) clinical competence assessment. [These were:](#) case suitability, case discussion and self-evaluation. [14 students who were taking the competence test and had watched the supporting videos were invited for focus group interviews. 12 students participated in three focus groups within 24 hours of the assessment and the audio recordings were analyzed.](#) A thematic analysis was performed using an inductive approach. Video access data was also retrieved and analyzed based on when the videos were watched.

Results: Three key themes were identified: assessment preparation, enhanced learning and affordance phenomena. By accessing the videos, students gained insights into the case suitability, assessment process and criteria, and the examiners' expectations. They reported reduced uncertainty and stress, improved confidence, and better preparedness for the assessment. Students also reported this video genre stimulated higher-order thinking and provided a broader clinical experience. A diverse array of viewing patterns were observed immediately before the assessment and across the year. For the focus group of students, they watched 65% of all their videos for the prosthodontics course one week before their competency testing periods.

Conclusion: The expert-student dialogue videos [that captured peers](#) clinical competence tests improved students' assessment literacy, increased [their](#) assessment preparedness, reduced stress and enriched their learning.

Keywords: video, online, dialogue, vicarious, assessment preparation

Introduction

Students in today's digital world have great expectation, demand and consumption for learning through videos. Videos for learning can provide a student-centered and potentially immersive learning environment for the development of "knowledge" as well as skills for cognitive and psychomotor performances. However, amongst many advantages, concerns have been raised regarding the difficulty in judging the content and quality of videos leaving students uncertain of the accuracy and applicability to their learning environment [1]. One solution is to create customized and validated video that is context specific both for the learners needs and for the teacher's goals.

Video-based learning in dentistry has been developed for a range of teaching needs including psychomotor skills, orientation to clinical environments, clinical skills, patient management and communication skills [2] with a range of benefits reported [3-6]. One area that has received little attention in supporting students through video is in clinical competence assessments. The goal of such assessments is to evaluate not only the recall of factual knowledge and demonstration of technical skills, but also students' capacity to analyze and synthesize information within a given context and situation that require higher order thinking and performance skills [7]. Competency testing is a critical part of dental education and has been reported to be a significant stressful event, particularly in that students have virtually no insights into the "black box" of a high stakes' summative assessment. In particular, what the experience is like, the questions asked and the standards expected [8, 9]. Discrepancies and differing levels of agreement on assessment between students and staff have been reported and are considered to be dependent upon the clarity of the assessment criteria [10]. Also, students need to compare their performance with assessment criteria and standards, identify gaps and implement strategies to address them [11]. Videos capturing competence assessments may be one way to educate students about the process and standards of clinical competence assessment, give student insights and reduce their stress. To assist students in understanding one particular clinical skills assessment, the author captured videos relating to the 5th year resin-bonded bridge (RBB) patient-based assessment and these were in-the-moment recordings of teaching and assessment episodes of expert and student dialogue including clinical case materials.

The focus of this study is to evaluate [the use and perceptions of](#) videos used to support students undertaking a clinical competence assessment, in particular a novel learning modality, previously described as the communal consultation video (CCV) [12]. This video genre captures the dialogic exchange of an expert and a student during a teaching and learning encounter and has been reported to cognitively engage, broaden experience, and support preparation for assessment and clinical care [13].

Methods

Learning resources

The fixed prosthodontics course comprises two parts relating to resin-bonded bridges (RBBs) and conventional bridges. The course utilizes a student manual that contains course objectives, associated learning content, and recommended reading lists/topics. In addition, to support student learning a library of videos has been developed by the author and archived on a university learning management system (Moodle). Students were advised to watch the videos but there was no course requirement for students to watch the videos. The RBB course has 74 videos classified into six categories ([Table 1](#)). Three relate to the theory and practice for RBBs [5] and three were specifically created to support student preparation for the RBB clinical competency assessment. The first category of video relates to *case suitability* to help students understand the selection criteria of the clinical case for the competence assessment. The second category of video is the *case discussion* in which on the day of the assessment students present their case to the assessor prior to starting the treatment on the patient and the last one is the *self-evaluation* videos that shows the student presenting their tooth preparation outcome and reflecting on their own performance with assessor capturing the questions, comments and feedback. In these videos, the content expert (MB) adopts a Socratic questioning approach to explore students' understanding and knowledge in relation to the learning situation. [Socratic questioning is an approach where questions are asked to help and guide the student to their own answer without telling them the answer.](#) These videos are given explanatory titles and key word identifiers e.g. "Restored abutment", "Missing upper premolar", "existing restoration", "fixed-movable", so that students can choose videos that suit their needs. These videos have been created over 4 years and represents previous years' student's recordings which may include students from their own year. For the assessment, [students work on](#)

their own patients whom they have been providing comprehensive care and in which a resin-bonded bridge has been treatment planned. The preparation of the case requires significant time and planning by the student as such bridges are usually one of the last treatment items provided.

Recruitment of participants

Ethical approval was obtained from the Institutional Review Board of University of Hong Kong / Health Authority Hong Kong Wester Cluster, (# UW-15-346). This study was conducted in the Faculty of Dentistry, The University of Hong Kong (HKU). The undergraduate dental program extends over six academic years. To join this study, participants would be a BDS V student taking the assessment during fifth and final year and who had watched at least one video before the assessment and were able to attend a focus group within 24 hours of the completing assessment. Fourteen eligible students were invited and from these 12 participants (7 females and 5 males) gave their written informed consent.

Focus group interviews

From the 14 students taking the competence test on the assessment week, twelve students consented and were assigned to 3 focus groups (4 participants in each group) according to their assessment date. All the focus groups were conducted in English in a quiet meeting room in the hospital without interruptions. An experienced focus group moderator (GXL) who was not involved in the key skills course moderated the discussion. A focus group guide was prepared by the course organizer to outline the aspects to be covered. The moderator kept a neutral and non-judgmental stance and was fully aware not to ask any leading questions.

The aim of the focus group was explained verbally and in writing to the participants with emphasis to understand students' experiences and views on their perceptions about learning and assessment preparation using videos. Students were reassured that there were no correct or wrong answers and that what they shared would not affect their grades or academic record in any way. The moderator encouraged all participants to share their experiences and views freely, and ensured the discussion was not dominated by any particular member. The moderator asked open-ended questions. Whenever needed, follow-up questions were asked to probe into the issue, ask for elaboration or clarify the details. At the end, the moderator invited students to share anything else they would like to bring up and to ask any questions they still had. Students were also reassured that all

opinions collected would be kept confidential and anonymous. All focus group interviews were audio recorded with the participants' consent. The data were securely stored as a computer file and were only accessible to the researchers of this study. Focus groups were terminated when data saturation was reached, i.e. when no new views were recorded during the thematic content analysis.

Transcription and thematic analysis

All the focus group sessions were transcribed verbatim by the research assistant (SY). The transcripts were then subjected to thematic content analysis by line-by-line coding manually. Themes were developed mainly through an inductive method (i.e. as they emerged from the data). The key elements that were relevant to the area of inquiry were identified and labelled concretely by using either the informant's words or the concepts of the researchers' disciplines. This process of open coding led to a clustering of substantive codes with similar content into themes, which were subsequently grouped and organized under analytical categories.

The thematic interpretation was performed by a trained researcher (SY) and was discussed and cross-validated with the other two authors until a consensus was reached. The members strived to avoid being governed by their own pre-structured understanding and to maintain a self-reflective attitude to ways in which the coding process could be influenced. To ensure reflexivity, competing explanations and alternative interpretations were taken into consideration. During coding and theme development, any ideas, preliminary assumptions, and theoretical reflections were noted and considered. The key elements of each theme were described and illustrated by original quotes (verbatim excerpts) or examples drawn directly from the transcripts.

Video viewing analysis

Data files containing all 47 BDS V students' access to the video learning resources was exported from the learning management system (Moodle). Repeated access that occurred within a three-minute period was ignored as an erroneous entry. It was presumed that multiple clicks within three minutes were to be problems with the streaming of the videos and therefore not counted. After filtering the data, the access was then classified according to: type of video watched and then by the time period when the video was watched. The time period was categorized into: views one week before the competency test and views across the academic year 2017-2018 (1st September

2017 to 31st August 2018). Data of the 12 students who participated in the focus groups was separated to compare to the whole cohort to observe any differences.

Results

Among the 6 categories of RBB videos (Table 1), the self-evaluation videos were most viewed by all 47 BDS V students over the academic year, with a mean of 9.2 views per video (range 0-42) (Table 2). The videos viewed by all BDS-V students one week before the competency testing periods accounted for 58.3% of all the videos viewed for the academic year. A similar pattern was observed for the 12 students who participated in the focus groups, with 65% of all their RBB videos viewed one week before assessment. Their individual consumption of key skills videos ranged from 1 to 18 views one week before the competency test (Table 3). Figure 1 illustrates the total number of views of each student one week before the competency test. This peaked 0-2 days before their assessment with the highest viewing being on the Sunday before their competency test. Figure 2 shows total views and videos watched one week before the competence test and the rest of the year for each focus group participant.

The video consumption rate for all the RBB videos for the 12 students (Figure 2) showed a wide array of viewing patterns across the year (14-77 views) and one week (4-71 views) before the competence assessment. Two students could be considered to be low consumers (<20 views), eight were moderate consumers (20-40 views) and two were high consumers (60-80 views). Four students watched a high percentage of their total (70-80%) one week before the assessment; five students had a moderate proportion (40-50%) and three students a relatively low proportion (20-30%).

From the thematic analysis, three key themes were identified (Figure 3) –

1. Assessment preparation
 - 1.1. Assessment literacy

The key skills *case selection* videos were regarded as “really useful” in the decision making for selecting cases for the competency test. The videos demonstrated similar case scenarios for

students to judge their case suitability without the need to consult teaching staff. Some students reported to have watched “pretty much all” of the categories of videos while others only “watch the video that is most similar to my case”. Students said “It helps a lot in determining whether our cases are suitable for the key skill or not”, “after watching the video it help me to confirm my case”. Students preferred videos rather than the PDF document as this document has “only photos and may not have different angles”.

Students reported that the RBB key skills videos helped them understand the assessment by providing the “general flow of the whole key skill (assessment)... from presenting the case to the clinical procedures and evaluating your preparation”. The key skills *case discussion* videos provided insights into assessment criteria and procedural expectations. Students said these videos gave “a brief picture of what we should prepare and what it would be like during the key skill” and “what I need to present”. Students felt well prepared for their case before assessment with the video providing an “example” and an “explanation” along with the expected questions by the examiner. This helped students justify their tooth preparation design and present clearly, “it gives us a mental preparation of how we are going to present our case” and “justify our designs”. The videos also served as “past paper”, “so we know some of the specific questions that will be asked”.

Students described the key skills *self-evaluation* videos to be “more practical” and “very helpful” as it allowed students to more accurately self-assess and judge their own clinical preparation for their key skill assessment. “Normally when you study by yourselves, we focus more on how to do it but not on...how to tell what we’ve done is good enough or not up to standard in a clinical situation”. The self-evaluation videos also provided an understanding of “the flow of the evaluation” by which students can see how others’ self-evaluation was performed and in turn how to do this themselves “in a more clear way”. These videos provide a “clear image about what the teacher is expecting” and “what is acceptable during the examination”. In particular, students reported, “the videos have like two purposes. The first is to teach us how we should evaluate our tooth preparation and the second is to let us know what criteria or what standards of tooth preparation are expected form us”. Students reported to "see and compare" their preparation to the models shown in videos and evaluate if "it’s up to standard or whether this kind of prep will lead to some other criticism or critique”.

1.2. Stress control and confidence

After watching the expert-student dialogue, students felt more confident and well prepared with “less uncertainties of the exams” and a “better understanding”. As shared by a student, “watching all videos will help in the exam as it allows me to know clearly about the concepts of the RBB and the general aspects”. The availability of the videos “practically and psychologically helps us feel more secure and prepared”. A student reported that preparation by watching the videos “gives me comfort...in case I really answer wrongly the consequence is less big”. Students stated that if they did not have the video resources they would feel “very lost about what to read” and “can’t expect what questions or what thing we should prepare for the exam”. The use of videos gave insights into the high stakes, stressful examination. Students expressed the videos “gives us an imagination of the exam, so will be like less stressful when you really encounter the exam”.

1.3. Clinical skills preparation

Students described the RBB videos to help link theory to practice as they transition from pre-clinical to clinical by providing a “real clinical experience”. Students shared “after you finish the sim-lab courses...which is in a very ideal condition” these videos help in “dealing with the conditions...commonly seen in the clinics”. The diversity of RBB videos provide a broader experience of different clinical cases/situations so that students “know more about cases we might not come across clinically”. Students said they have an authentic learning experience as these videos illustrate a “real case for the key skills”. The videos act as a visual prompt and facilitate a better understanding through visualizing content which are difficult to comprehend than “just by reading text and trial prepping”.

2. Enhanced Learning

2.1. Learning resource

The RBB videos were a special learning resource in providing contextual, authentic learning experiences and in catering to students’ learning needs. Students reported the videos are useful in providing answers, “I think usually the videos answer all our questions”, “Whenever I have the

question I just go back to the video and watch again” and this “re-enforces revision”. The videos also delivered new knowledge, reinforced it and facilitated error correction. Students reported, “I will jot it down after the video” when they learn new knowledge from the video and that the videos “can also consolidate our knowledge about the cases” and by observing others errors it can “help us to prevent the similar error that we will encounter during the key skills or during clinical work”. Error correction was particularly useful for students to visualize and learn from, when they observe students “who need some modifications after the evaluation ...this is good because it might come out in our case so we can know...clinically if we meet the same situation”.

2.2.Cognitive engagement

These dialogic videos stimulate cognitive engagement as students reported thinking of their own answer while watching the videos, “every time after Dr X ask a question and the student replies, there will be some time like 1-2 second of pausing so I can also think of my own answer”. Students would also analyze the dialogue and “critically think whether the answers are correct or not and if I think that I have some doubts then maybe I ask a tutor or think of any like alternative answers”.

The nature of the expert-student dialogue was perceived as useful as “when the examiner was asking the question, I already had the answer in my mind, but (when the) student was saying something totally different and I was like, no that is not the answer, so it will reinforce my memory”. Students would also actively seek videos as a learning resource as “whenever I have (a) question I just go back to the video and watch again”. Students also recommend their peers to seek particular videos “so they can learn from it”.

2.3.Broader clinical experience

Observation of other students’ presentations and evaluations allowed students to gain a broader clinical learning experience and different student perspectives. Students reported to “learn from other cases since our cases are always different from others” as “we don’t always encounter all sorts of cases” and “watching those videos puts us in their situation so in the future when we encounter those situations we can refer back to those videos”. By observing others’ cases “even though we are not taught clinically, we can have a way to know how it should be done”. Watching

expert-student dialogue also helps students experience with clinical judgment, critical thinking and decision-making, “it’s a good practice to see how other people evaluate their cases and their treatment planning...it helps us to know what factors there are to consider”.

3. Affordance phenomena

Students commented positively on the affordance of video to capture, catalogue and display these novel teaching and learning situations. Students valued the categorization of videos by key words and subtitles which helped students “reduce the time” and “easily choose which video we need to watch” so that it was “easier for us to match our case with them”. Students also commented on the presentation format and access (player controlled, curated format, asynchronous, and on demand). With student control over the playback speed, they could “speed up the video and shorten the time of the video” to “watch the same amount of content and same length of videos...at a faster rate”. The online access and its functionality features allowed students to learn at their own pace, place and time, enabling increased autonomy and sense of control over the learning process. Students reported videos to act as a reference resource for students to “always go back and to refer back to”. Students reported to re-watch selective case videos for “writing the notes...because I want to cover all the information”.

Discussion

This new video genre using contextually authentic, recorded expert-student dialogue demonstrating different stages of a clinical competence test was found to be highly supportive for students’ preparation for the assessment and their learning in general. It helped close the gap between assessment preparation and competency testing by demonstrating *in situ*, authentic experiences of the assessment with regards to its scope, criteria, standards and expectations.

Research has shown that if students do not develop an understanding of the assessment processes, their learning outcomes will be limited [11]. Sharing of knowledge on assessment standards and requirements has been reported to yield better learning outcomes from assessment [14]. These clinical skill assessment videos acted as an authentic guide providing specific contexts, questions

and answers thereby forming a scaffold or framework for students to acquire knowledge, higher order thinking skills and assessment literacy.

In a systematic review of studies among dental students, examination and grades have been reported as the main sources of stress [15]. Issues raised by students were associated with perceived lack of clarity in assessment expectations indicating discrepancies in student and staff expectations [16]. Students reported to experience stress when staff expectations were incongruent with the students' own perceptions of their work, affecting their self-confidence and performance [13]. These clinical assessment videos opened the black box of assessment, allayed student's uncertainties and made students feel prepared with confidence for the assessment. Instilling confidence through video has been reported when performing dental clinical skills on pediatric patients for behavior management [17]. In another study student perceptions of their self-efficacy and preparedness for assessment were reported to be significantly correlated with the number of videos they viewed [18].

This teaching and learning approach is novel in several ways; namely the new learning genre (expert-student dialogue), its student centered approach, task and context specific nature relating to assessment and authenticity and design of different types of videos to support the different stages of students' assessment. Such an approach is supported by several educational theories/principles including the learner control principle, the worked example principle, and the self-explanation principle [5].

The learner control principle advocates that students take control of the learning materials with regards to information selection, its sequence and pace [19-21]. The catalogued access menu, description, and key words allow easy navigation and easy access to meet students' learning needs [22, 23]. This allows students to define their own learning experience and through this construct their own knowledge [23, 24]. In this study students reported to reflect and make their notes while watching videos, such active learning has been associated with multiple cognitive benefits such as increased attention, enhanced mental processing of content and better retention of information [25]. [The Key skills videos act as a tool with different modalities for learning \(audio, visual, remote access and playback control\). Each of which offers an affordance. The term "affordance" refers to](#)

the perceived and actual properties of something, primarily those fundamental properties that determine just how it is used [26].

The worked example principle is reflected in the numerous authentic cases/examples included in the videos that reduces cognitive load during problem solving or learning episodes [27]. In such scenarios, the problem (e.g. the learning issue) or learning task design (e.g. questions asked) has guided logical steps (e.g. students' attempts to answer the questions) to the solution [28]. The key skill videos involve the examiner probing students' knowledge through Socratic dialogue from which observers (other students) cognitively engage, follow and learn. In this study, students reported to use the videos as a reference answer as they engaged in the authentic performance of peers in the assessment process.

The self-explanation principle encourages the use of constructive learning activity to support deep learning by engaging learners cognitively with the learning resources. In this video genre, students are deriving their own answers along with analyzing their peers' answers, a process that can help learners to make inferences, identify misconceptions, and repair mental models [29, 30]. In the current study, students cognitively engaged in these context specific learning resources and developed new knowledge with a broader clinical experience.

The access analytics of the video resources provides some insights to students' consumption across the year and one week before assessment. There were high and low consumption across these two periods and combinations of both. Some students showed a high proportion of video consumption before the assessment compared to their total across the year and some the other way around. High consumption values across the year may be a sign of a diligent, self-motivated student aiming to deepen their knowledge or, in contrast, a student struggling to understand the knowledge and principles of a subject. These insights give a snapshot into the diverse learning behavior of students relating to their preferences, learning needs and learning personalities. This phenomenon underpins the value of this novel video learning approach in which students take control of their own learning and maximize the benefits these videos may offer to each learner. The student cohort performing their competency assessment used these task specific videos for just-in-time learning to prepare them for the summative assessment and they were regarded as very supportive for the knowledge, performance skills and assessment literacy. It was interesting that the peak viewing day was the day immediately (one or two days before) before the assessment for the majority of

students and notably higher on the Sunday before the assessment where they would have more free time to work through the learning resources. After the assessment, the usage of videos dropped significantly.

Analytics data such as this allows educators to see how students use learning resources and perhaps give some insights into learners' behavior and video access patterns for course designers. In this study, there is no recall bias as the focus group interviews were conducted the next day of the competency assessment. Student access to the videos is unlikely to denote gaming of the system, as the videos were not compulsory nor recorded for any formative or summative outputs. It should be noted that the present study was conducted in a single dental institution, involving one tutor, which may challenge generalizability. However, while one realizes the findings cannot be directly extrapolated to other dental schools, it is expected that many themes will be similar and provides a framework for others to follow. With regards to sample size, the group of students interviewed represented 12 of 14 students [who took the competency test on the assessment week and this](#) can be considered good compliance and a random sample of the year, given that students were able to choose when they decided to take the exam during the year. [However, it was still a sample of the larger cohort and there is the potential for bias.](#) Students had been familiar with the expert-student video genre for many years in the course and so being able to see the benefit of such videos they were supportive in being recorded for the summative assessments. Their consent is recorded in the video and in the course manual students are informed that any time they can have the video removed from the library. No videos have been requested to be removed and from recollection, no student has refused to participate in expert-student dialogue videos. These videos have been performed by one member of staff as the expert and as such may not be generalizable to other environments as it may require a certain rapport with students to initially be interviewed. It is suggested to start with low stakes learning situations to build a library of dialogic videos for learning.

Conclusion

The key skills expert-student dialogue videos improved students' preparedness for clinical competence assessment (knowledge, process, standards and reduced stress), were cognitively

engaging and broadened experience. These along with facilitation of learner control lead to an enriched learning experience and reduced stress.

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Table 1. Categories of RBB videos

S.No.	RBB video categories	No. of videos	Mean duration (range)
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1.	Knowledge videos Theory, tooth preparation demonstrations, framework design	21	8.07 min (2:25-17:33)
2.	Student question and answer videos Authentic student generated questions with Socratic questioning to explore and define the answer	8	4.57 min (2:28-7:19)
3.	CCV treatment planning videos Student generated and problem oriented questions relating to treatment planning and prosthesis design of student cases	28	9.22 min (4:16-24:08)
4.	Key skills case selection videos Student generated questions related to the nature of their proposed cases for the key skills and if the case meets the selection criteria	8	4.19 min (1:21-5:33)
5.	Key skills case discussion videos (before tooth preparation) Student led case presentation with an examiner asking questions to examine knowledge and skills prior to performing the tooth preparation	4	6.27 min (3:59-8:42)
6.	Key skills self-evaluation videos (after tooth preparation) Student led self-evaluation and critique of their tooth preparation outcome with an examiner asking questions relating to the outcome, self-evaluation skills and if the required standard has been met	5	5.02 (1:19-11:18)

CCV = Communal consultation videos, RBB = Resin bonded bridge

Table 2. Distribution of the key skills videos viewed by all BDS V students for the academic year 2017-2018 and for the period of one week before the competency test periods

Video categories (no. of videos)	Total number of views		Mean views per student (Range)	
	52 weeks	One week before CT	52 weeks	One week before CT
Key skills case selection videos (8)	281	145	5.9 (0-19)	3.1 (0-17)
Key skills case discussion videos (4)	293	164	6.2 (0-22)	3.5 (0-14)
Key skills self-evaluation videos (5)	435	256	9.2 (0-42)	5.4 (0-21)
Total (17)	1009	565	21.5 (0-67)	12.0 (0-39)

CT = Competency test, 52 weeks = academic year 2017-2018 (1st September 2017 to 31st August 2018).

Table 3. Distribution of the key skills videos viewed by the 12 focus group students, one week before competency test

Video categories (no. of videos)	Total number of views	Mean views per student (Range)
Key skills case selection videos (8)	25	2.1 (0-8)
Key skills case discussion videos (4)	39	3.2 (0-7)
Key skills self-evaluation videos (5)	57	4.75 (0-9)
Total (17)	121	10.5 (1-18)

Figure 1. Frequency distribution of total number of RBB videos viewed for the period of one week before competency test by [all](#) 12 focus group students

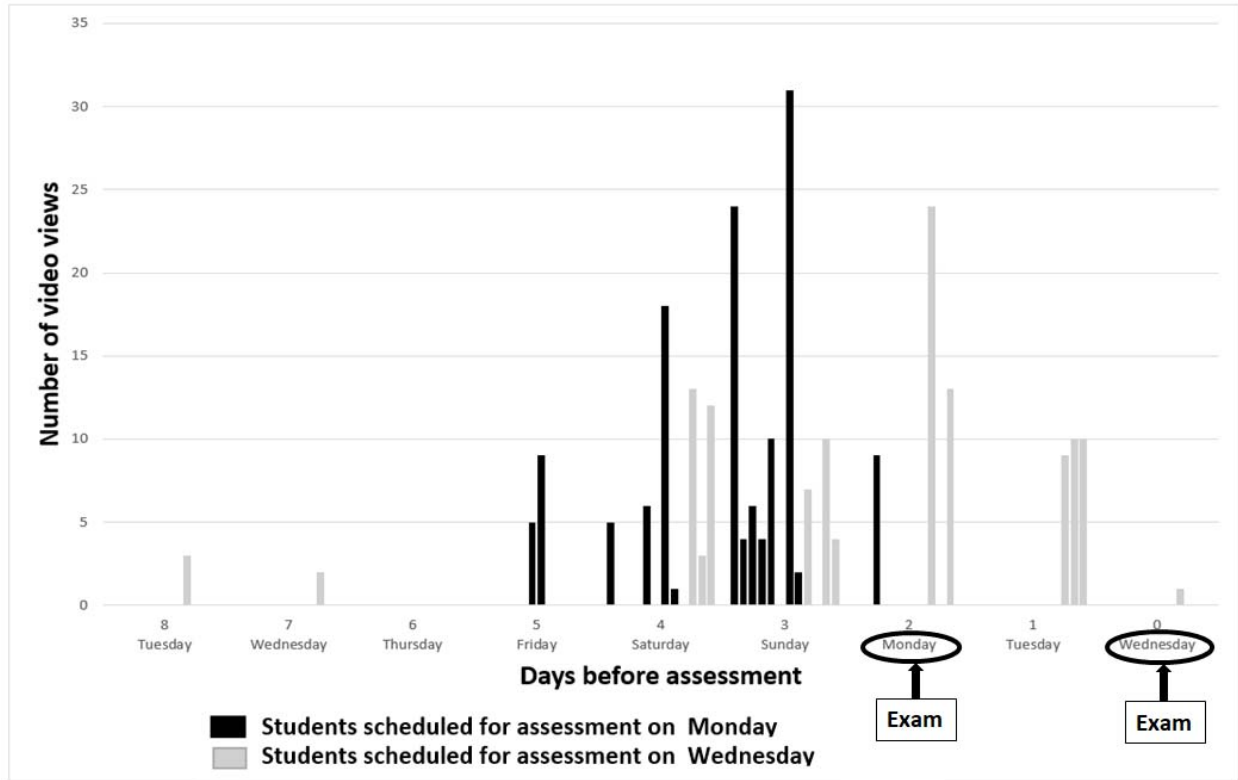


Figure 2. Total views of all RBB videos watched during one week before competency test and during the academic year for the 12 focus group students

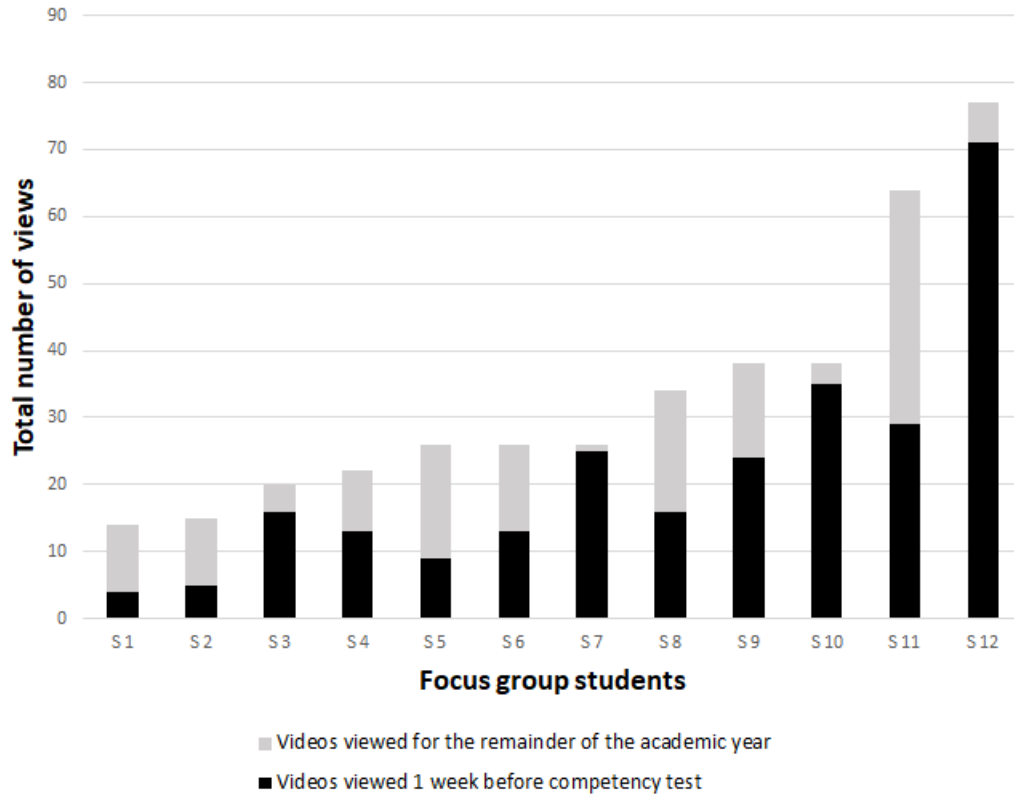


Figure 3. Diagrammatic representation of the thematic analysis from the focus group interviews demonstrating the three main themes and associated sub themes

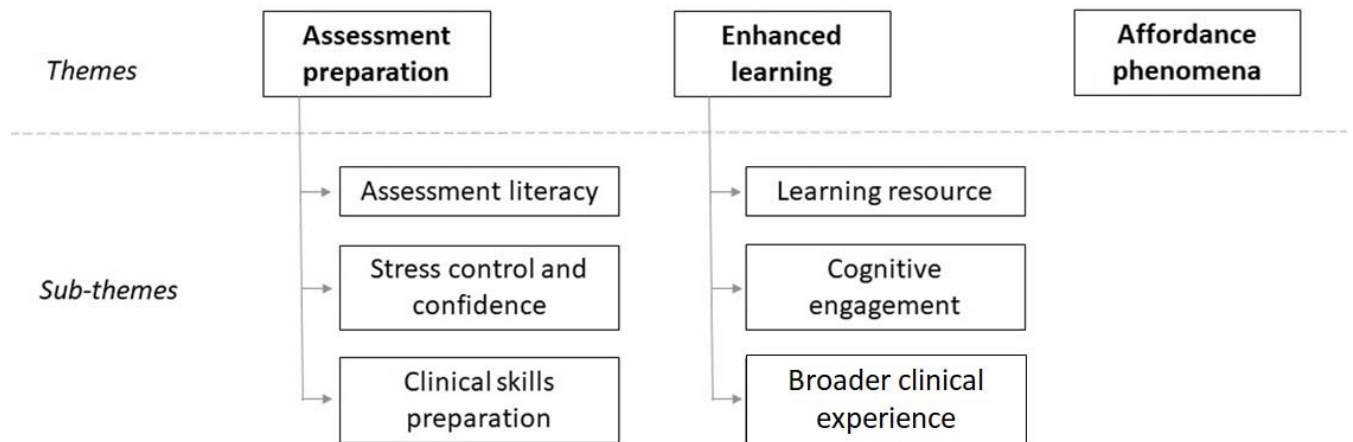


Table 1. The six categories of RBB videos

RBB video categories	No. of videos in each category	Mean duration (range)
Knowledge videos Theory, tooth preparation demonstrations, framework design	21	8.07 min (2:25-17:33)
Student question and answer videos Authentic student generated questions with Socratic questioning to explore and define the answer	8	4.57 min (2:28-7:19)
“CCV” treatment planning videos Student generated and problem oriented questions relating to treatment planning and prosthesis design of student cases	28	9.22 min (4:16-24:08)
Key skills case selection videos Student generated questions related to the nature of their proposed cases for the key skills and if the case meets the selection criteria	8	4.19 min (1:21-5:33)
Key skills case discussion videos (before tooth preparation) Student led case presentation with an examiner asking questions to examine knowledge and skills prior to performing the tooth preparation	4	6.27 min (3:59-8:42)
Key skills self-evaluation videos (after tooth preparation) Student led self-evaluation and critique of their tooth preparation outcome with an examiner asking questions relating to the outcome, self-evaluation skills and if the required standard has been met	5	5.02 (1:19-11:18)

CCV = Communal consultation videos, RBB = Resin bonded bridge

Table 2. Frequency of the key skills videos viewed by the whole class of BDS V students for the academic year 2017-2018 (52 weeks) and for the period of one week before the competency test (CT) periods

Key skills categories (no. of videos)	Total number of views of whole class		Mean views per student (Range)	
	52 weeks	One week before CT	52 weeks	One week before CT
“Case selection” videos (8)	281	145	5.9 (0-19)	3.1 (0-17)
case discussion videos (4)	293	164	6.2 (0-22)	3.5 (0-14)
self-evaluation videos (5)	435	256	9.2 (0-42)	5.4 (0-21)
Total (17)	1009	565	21.5 (0-67)	12.0 (0-39)

CT = Competency test, 52 weeks = academic year 2017-2018 (1st September 2017 to 31st August 2018).

Table 3. Frequency of the key skills videos viewed by the 12 focus group students, one week before competency test (CT)

Video categories (no. of videos)	Total number of views of focus group	Mean views per student (Range)
Key skills case selection videos (8)	25	2.1 (0-8)
Key skills case discussion videos (4)	39	3.2 (0-7)
Key skills self-evaluation videos (5)	57	4.75 (0-9)
Total (17)	121	10.5 (1-18)

Figure 1. Frequency distribution of total number of RBB videos viewed for the period of one week before competency test by all 12 focus group students. Each bar represents one students access to the videos

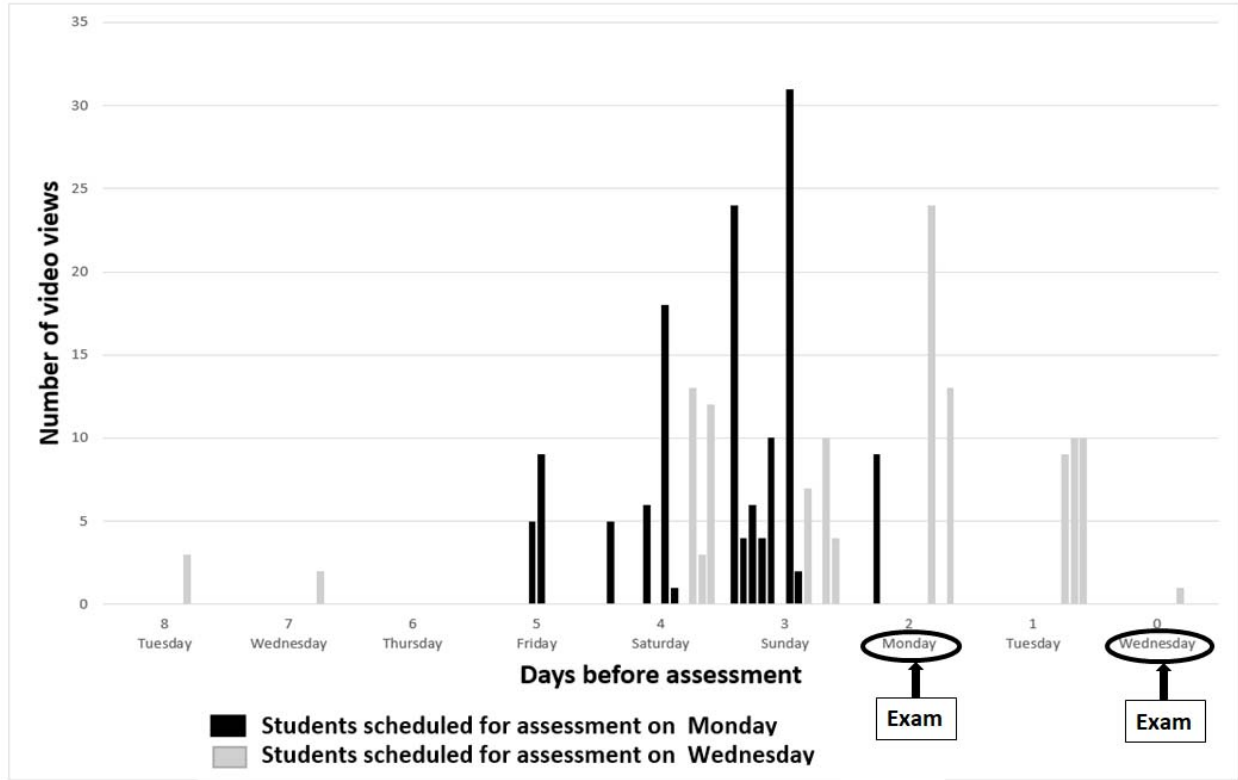


Figure 2. Total views of all RBB videos watched during one week before competency test and during the academic year for the 12 focus group students

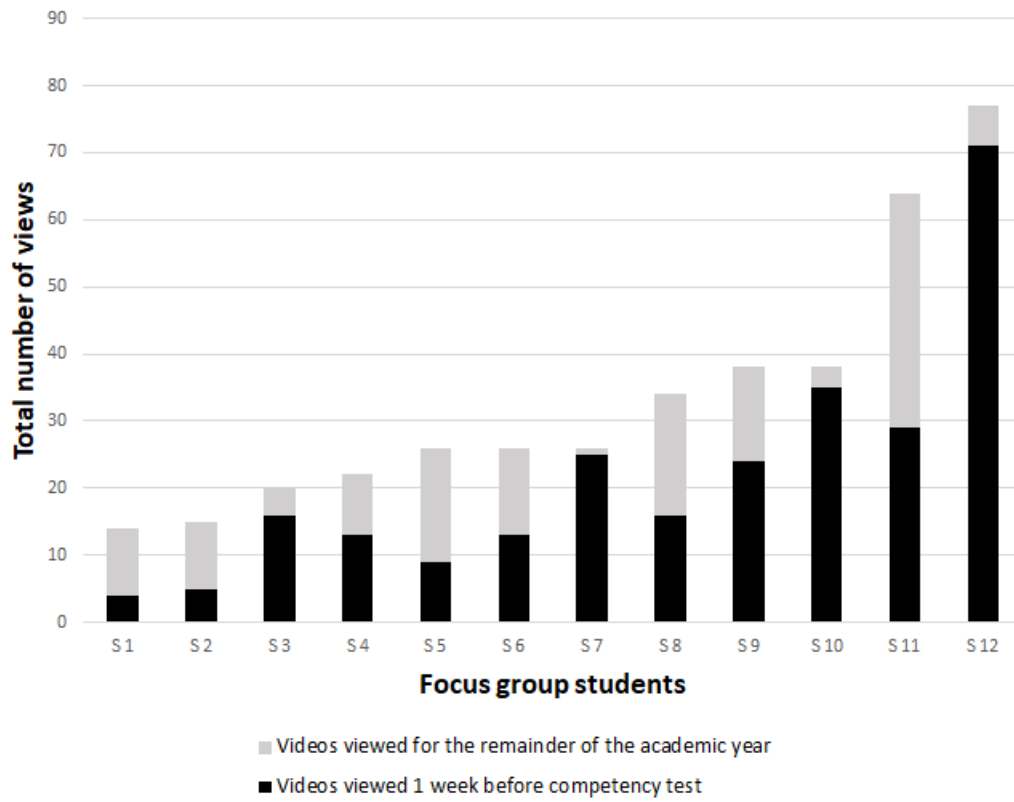


Figure 3. Diagrammatic representation of the thematic analysis from the focus group interviews demonstrating the three main themes and associated sub themes

