How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences.

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Contents

1 ABSTRACT

Background: Social media applications like Facebook, Instagram, Twitter, YouTube, Snapchat, WhatsApp and LinkedIn, are immensely popular amongst educators and learners. Social media has content in different forms like videos which are popular as a source of learning, due to its accessibility and the ability to repeat watch. Videos in education help enhance learning, so do procedural videos posted on social media but with significant disadvantages of distraction, no control over quality by learners and added responsibility on Educators. Social media patient videos can complement creating educator's online resources by communication, feedback, collaboration, access to resources and interaction. Can educators utilise social media patient videos in teaching so that the students can use social media in education better?

Aim: The study aims to understand the experiences, choices and outcomes of dental educators in using the social media patient videos present on Facebook, YouTube, Instagram and other social media platforms for learning clinical skills and its alignment with the learning.

Methods: An explorative qualitative research design was undertaken on dental educators teaching different dentistry subjects for at least four years in various dental colleges. Nine semi-structured interviews were digitally recorded, translated and transcribed verbatim. Data was analysed thematically using framework analysis.

Results: Six main themes emerged from the data, namely opinion on social media platforms, learning through videos, outlook on operative procedures hosted on social media

platforms, incorporation of procedural videos hosted on social media into teaching, learning from operative procedures posted on social media, and lastly strengths and shortcomings.

Conclusion: The above qualitative research highlights that procedural videos posted on social media platforms are a popular and helpful aid for self-directed learning for both educators and learners. Educators opine that this teaching-learning tool is a double-edged sword with the benefits of saving time but added responsibility, including standardization of this self-directed learning method.

2 INTRODUCTION

Social media are interactive computer-mediated technologies that help share data, concepts, professional options and other forms of expression via virtual groups and systems (Kietzmann *et al.* 2011). A few examples of the most commonly used social media applications are Facebook, Instagram, Twitter, YouTube, Snapchat, WhatsApp and LinkedIn. Videos in education help to enhance learning by audiovisual pathways (Brame 2016)**.** Educational videos are an essential source of learning nowadays (Barry *et al.* 2016), and a good content video may provide a good source of learning for students (Burns *et al.*2020). Social media has content in different forms, with videos being popular. For instance, social media patient videos can be watched, shared and commented on by anyone from any part of the world. In addition, social media patient videos have the potential for a blended curriculum in online teaching, and online videos can be beneficial for the present generation who have greater access to internet facilities.

Nowadays, students access social media patient videos created by clinicians, peers, clinics and universities at their suitable time for learning in a self-directed manner. Students have no idea regarding the quality of these videos, and mostly, there is no regulation about videos on social media. Therefore, the students adopt self-directed strategies to master skills outside timetabled training sessions (Duvivier *et al.* 2012). Newer generation dental students are well versed with e-learning and online resources and are spending more time on online resources (Turner *et al.* 2016). Due to the availability of many online resources for learning, it becomes easy for students to access and learn (Santos *et al.* 2016; Trelease 2016).

Clinical skills are essential competencies assessed in the dental curriculum and required during dental practice after graduation (Field, Cowpe and Walmsley 2017). Traditionally clinical skills are learnt in simulation labs or directly on patients under supervision. The present dental education is influenced by improvements in technology and is moving towards computer-based and online learning alternatives, especially during this Covid-19 pandemic. Dental educators and colleges integrate different online technologies in dental education and create an online presence due to increased social media usage (McAndrew and Johnston 2012; Arnett, Loewen and Romito 2013). Presently e-learning is time-consuming for educators in creating online resources which leads to work outside scheduled hours (Delgaty 2013). Using social media in teaching offers educators the prospect to devise constructivist and connectivist learning theories (Siemens 2005). Educators can help learners improve learning from peers, share information, collaborate outside the dental college, discuss ideas, create groups, and join social media specialists.

The efficient use of readily available social media patient videos can reduce the workload of educators. Social media patient videos can complement creating educator's online resources by communication, feedback, collaboration, access to resources and interaction (Cheston, Flickinger and Chisolm 2013). Can educators utilise social media patient videos in teaching to use social media in learning clinical skills?

2.1 AIMS OF THE STUDY

The study aims to understand the opinions and experiences of dental educators in using the videos of operative procedures hosted on social media platforms.

2.2 RESEARCH QUESTIONS

- Role of operative procedure videos hosted on social media platforms about teaching clinical skills
- To integrate operative procedure videos hosted on social media platforms into teaching

3 REVIEW OF LITERATURE

3.1 INTRODUCTION

The researcher carried out a literature review to bring together available data related to the planned study area and estimate data already existing on the research question. In addition, the review helps find aspects of the researched topic that have not been considered or areas where existing evidence was limited. This information provided the background and foundation on which the present study was planned.

The literature review also provided an opportunity to study the methodology implemented by preceding studies for their data gathering and analysis and assess their strengths and weaknesses, if any. Thus, the review of the literature aided in the robust design. Furthermore, the literature review also provided relevant information against which the results of the present study were compared and analysed, adding to existing knowledge on the subject and possibly generate areas for further research.

3.2 METHODOLOGY

This section will present the methods engaged in shaping the literature included in this literature review. In addition, the methodology section will mention the keywords/search terms used, the sources of information and the inclusion and exclusion criteria for the literature of this study.

3.2.1 THE KEYWORDS/SEARCH TERMS USED

The keywords used in searching for literature in this study were,

Health Education	Dental education, medical education
Educators	Dental educator, medical educator
Social media	Videos
Curriculum	Online learning

The search terms above, inclusive of Boolean operators, namely AND was used to search for literature from the following databases:

- Education Resources Information Center (ERIC – www.eric.ed.gov)
- BioMed Central (www.biomedcentral.com)
- MEDLINE/PubMed (www.ncbi.nlm.gov/pubmed/)
- Google scholar (www.scholar.google.com)
- Scopus and EMBASE.

3.2.2 CRITERIA FOR INCLUSION AND EXCLUSION OF LITERATURE

The literature retrieved will have the following inclusion criteria (Boulet, Jack. and Friedman, 2018) like questionnaire studies, systematic reviews, qualitative studies, English language articles only, peer-reviewed articles, open access articles, articles published in available journals, articles with pdfs freely available online and institution's library and Keele's library.

Exclusion criteria for articles retrieved will be any other language articles, e.g., Spanish, Chinese etc., online articles not peer-reviewed, articles published in online journals but not

indexed, articles of poor quality, e.g., improper conclusions and having bias. Evaluating the articles for quality involves discussion and listing strengths and weaknesses. In addition, a critical review of the literature will help to make the argument regarding the need for the study.

Mendeley reference manager application is used for referencing and citation lists (*Mendeley Reference Manager | Mendeley*, no date).

3.3 FINDINGS FROM THE LITERATURE REVIEW

3.3.1 VIDEOS AND LEARNING

Clinical knowledge and technical skills are often obtained through classroom lectures, small group learning, conferences and hands-on workshops. Practical demonstrations through primary education pose challenges to learners due to the limited visual access during the procedures on actual patients, information overload of all the procedures in a complete demonstration, and some students experience the Hawthorne effect. Such an event often results in missing crucial steps, overlooked nuances and details forgotten as the single performance demonstration do not permit close-up viewing to some students; control of the demonstration or revision at a later time also becomes impossible as the live demonstrations usually happen one time. Medical learning has grown exponentially, crossing the limits of the classroom, and social media is seen as the link that connects informal and formal ways of education as it keeps the learners highly involved with the educational content in a multitude of ways when they are not present in the classroom (Brame 2016). Incorporating digital technology into the daily routine has drastically changed learning and teaching for students and educators. They do not have to rely on textbooks; resources like eBooks, journals, online lectures, teleconferences, and instructional videos are readily available at numerous social media websites. Social media has a

vast range of educational material, among which videos are popular. Videos can be watched, shared and commented on by anyone from any part of the world and have the potential of the blended curriculum in online teaching (Prober and Khan 2013).

Video usage in health education has risen exponentially in the past decade. It has enabled students to afford a better learning experience with on-demand access and increased control over the videos due to the option of repeated watching (Bell 2007). The added advantages are accessibility and standardisation of clinical education among time zones and geographical differences to align with experiences and learning (Alzahrani *et al.* 2020). In addition, instructional videos of various complex surgical procedures have become popular in recent years as these videos are being constantly uploaded to social media sites (Alzahrani *et al.*2020).

Learning through videos stimulates the auditory and visual pathways. "Working memory" is essential to learning and converting short-term memory into long-term working memory (Livant 2007). Working memory is essentially conscious attention and is limited in its capacity to the amount of information processed at a given point in time. Working memory creates "schema" held in long-term memory and comprises three types of cognitive load. Keeping this in mind, an educator can plan experiences that maximise education by carefully considering and monitoring every kind of cognitive load and reducing overload (Fiorella *et al.* 2017; Turkyilmaz, Hariri and Jahangiri 2019).

3.3.2 SOCIAL MEDIA PLATFORMS

Today's millennial generation students have a greater demand and expectation from their learning materials as they dedicate more time to social media in their high-tech digital devices. Social media has significant opportunities for healthcare educators. Given the accessibility to

media devices, students have the advantage of accessing and observing videos when and where they like in context with their knowledge and personal education needs. Learning through social media might also help the students to build confidence and reduce anxiety. Visual images are more beneficial over verbal communication or textbook pages as they present information in a simplified and dynamic manner, clarify pieces of abstract language-based concepts, and conceptualise studies that are in motion and relate to one another while being more efficient and effective at getting audience attention (Fox 2003). The incorporation of images into the educational process increases learning retention (Gao *et al.* 2015).

Students can view, comment and share social media instructional videos created by clinicians, peers, clinics and universities at their suitable time for learning in a self-directed manner. However, the quality of the videos is questionable. Newer generation dental students are well versed with e-learning and spend more time studying online resources (Miller and Metz 2015). Due to the availability of many online repositories in terms of social media for learning, it is easy for students to access and learn various theoretical topics or clinical procedures. The instructional videos enhance students' interactivity and spatial ability, critical thinking, and clinical correlations by integrating dental disciplines.

El Bialy and Jalali (2015) studied the perceptions behind the use of social media for educational purposes by medical educators and students. The majority of the respondents to the survey, both medical educators and students, had their presence on social networking sites, among which Facebook, Twitter were the most popular, followed by LinkedIn, Google+, YouTube and blogs. Most educators and students found that social media effectively improved the learning experience, with disadvantages being distraction and privacy matters. They concluded

that medical educators could help the students utilise social media to its optimum with online study materials that are specific, engaging, and achieving learning objectives.

Dentistry is a challenging professional course where students acquire complex theoretical knowledge and skills to translate and apply to clinical scenarios and situations (Reissmann *et al.* 2015). Psychomotor skills or procedural learning is the main component of dental skills learning which has primarily been taught through live demonstrations and practising on manikins. The acquiring of psychomotor skills is a critical part of dental education and requires theoretical, procedural and performance skills so that students gain confidence to perform the clinical procedures on patients (Nicholls *et al.* 2016). The present dental education, influenced by improvements in technology, is moving towards computer-based and online learning alternatives. Dental educators and universities are implementing different strategies using online technologies to create an online presence due to increased social media usage. Presently e-learning is time-consuming for educators in developing online resources and leads to working unscheduled scheduled hours. Social media use in teaching provides educators with the prospect to device constructivist and connectivist learning theory (Flynn, Jalali and Moreau 2015).

Educators are exposed to connectivism theory which is particularly relevant and applicable as a learning theory to inform the use of social media in medical education since it's explicitly developed to conceptualise learning in the context of modern-day technology. It can help learners increase their learning potential, improve learning from peers, share content, connect outside the classroom, exchange ideas, create groups, and join content specialists (Duvivier *et al.*, 2012). The use of free and readily available social media patient videos can reduce the workload of the educators (Cheston, Flickinger and Chisolm 2013). The difference in learning

styles between medical students, clinical residents and faculty can be due to differences in base knowledge and experience. Learning through videos offers medical students a concise guide to follow, which resolves the uncertainty and apprehensiveness from lack of expertise and presumptively increases confidence.

An online survey via Survey monkey on 1083 Australian medical students showed that the vast majority (92%) use online teaching videos for their learning. The online survey concluded that e-learning effectively supports clinical education and their primary source of information was preferably online media. Facebook was their most preferred or used application (Giordano and Giordano 2011). People learn efficiently from multimedia instructions, especially in medical education, due to the benefits like moving images to teach skilled procedures and techniques, including a physical examination (Mayer 2010).

In both the dental and medical fields of education, YouTube has been the most frequently used social media platform by health profession's students. According to recent literature, medical trainees and surgeons commonly use YouTube as their primary preparatory resource for surgical cases. Mukhopadhyay, Kruger and Tennant (2014) evaluated if forty dentally related videos could be used as a freely available tool for learning via YouTube. This study reflected that YouTube is an additional tool to aid dental teaching and understanding due to its easy accessibility online for the dental profession, whether practitioners or students, even those in geographically remote areas.

Aldallal, Yates and Ajrash (2019) conducted a descriptive cross-sectional study to evaluate the use and efficiency of YouTube as an aid for learning oral surgery by fourth and final-year

university dental students. A study-specific survey revealed that YouTube was an effective learning tool, widespread among the students. Most students followed study material posted on YouTube, and it affected their practice. The main drawback of YouTube being an educational material is that it might not align with the curriculum. Students are advised to take caution as educational content might not be standardised and aligned with learning objectives. Institutions should provide standardised online education material for students to overcome this drawback.

Similarly, Burns *et al.* (2020) researched the use of YouTube as a learning aid among third- and fourth-year dental students for clinical procedures. The results agreed with the previous studies that YouTube videos on clinical guidelines were helpful and popular among students. The students wanted their dental school to post teaching-learning material to YouTube or any other social media platform. However, the respondents had their doubts about the validity of the video and its accuracy. Nevertheless, they concluded that the new generation of students felt that YouTube improved learning and suggested that dental institutions enhance the clinical, educational curriculum by developing more evidence-based instructional videos.

3.3.3 VIDEOS IN HEALTH EDUCATION

Jang and Kim (2014) conducted a mixed-methods study using 30 items questionnaire to study student insights and usage of OSCE (Objective Structured Clinical Examination) videos followed by a detailed semi-structured interview. It was observed that for some students watching videos by itself might be insufficient to learn clinical skills. OSCE videos will be used more effectively by integrating into faculty teaching and making them interactive, with accessibility from mobile devices being more convenient.

Botelho, Gao and Jagannathan (2019) studied the influence of videos that supported students' improvement of psychomotor skills. Interviews were conducted among fourth and fifth-year dental undergraduate students, digitally recorded and transcribed. They found four critical domains from the thematic analysis: access and functionality, understanding and learning, preparation of clinical skills and performance, and additional learning tools. The videos were perceived as a crucial learning resource with access just at the tap of fingers, as also functional control and specific features possible only with videos compared to textbooks and conventional methods. Additional advantages were clarification of knowledge, enhanced cognition and improved revision of clinical skills and theoretical concepts. They concluded that learning from videos has certain unique features which engage awareness better and prepare students mentally for patient care before performing clinical skills.

Aragon and Zibrowski (2008) assessed the skills of dental students from their performance in the preclinical practical examination on an all-ceramic tooth preparation and fabrication of provisional crown after exposing them to a novel instructional video. An instructional video explaining step-by-step procedures of all-ceramic tooth preparation and temporary crown fabrication given to all the students after a lecture and a live demonstration of the same process as in the video. The students then practised on manikins individually. The student's scores on three practical exams (PE1, PE2, and PE3) compared to the practical exams held during the previous year before the video was developed. The performance of the students exposed to the video was better significantly in PE1 in comparison with the year-earlier and compared to their performance in PE2 and PE3, which had no additional teaching aids. The

authors concluded that instructional videos of the same could significantly improvise improper view during live demonstrations of fixed prosthodontic preparations.

Dental students usually face difficulty in understanding basic sciences, like physiology, its importance or clinical relevance. To overcome this issue, Miller and Metz (2015) evaluated a series of video modules using patient simulations and customised animations depicting medical emergencies in dental practice. A total of 120 students participated in a survey of which first-year students had watched the video modules while fourth-year students had completed the course before customising the video series. The students appreciated the clinical implications of the videos, with the advantage of being interactive and thus helping in better understanding of the basic concepts. Furthermore, first-year students improved significantly in their ability to solve challenging clinical questions than fourth-year students, which further reinforced the observation that the customised video series improved and aided in better understanding and its clinical application.

Another study performed by Edrees *et al.* (2015) checked the benefits of video-mediated endodontics demonstrations for teaching-learning purposes. At the endodontic preclinical course, the students were introduced to treatment procedures in the clinic by watching two live patient demonstration videos. After watching each video, the students were given a questionnaire to analyse their opinions about the different steps of the endodontic treatment procedure and its advantages for their clinical practice. The results showed that the students credited immense importance to the video demonstrations related to treatment procedures and considered it valuable for learning, the difference being statistically significant.

Rapp *et al.* (2016) executed a survey with learners and faculty from the Department of Surgery at the University of Iowa to determine the frequency and incidence of watching medical procedural videos before preparing for surgeries. The authors concluded that maximum learners and faculty used procedural videos but preferred reading for overall preparation. Both used videos from different social media platforms, the most popular being YouTube. The authors also suggested that optimum access to learners before surgeries can be attained by posting surgical videos to YouTube.

Education in surgical skills has specific challenges due to its cognitive and technical training components. Educators in medical education are constantly in search of teaching methodologies that specifically produce measurable, improved learning outcomes. A prospective study by Mendez *et al.* (2014) with six junior otolaryngology residents performed a control selective neck dissection before and after training with a High-Definition Video Module (HDVM) teaching module. The module helped the residents differentiate between procedural or insufficient execution surgical errors and significantly reduced them. An added advantage was they helped attain a balance between cognitive and technical skills of the surgical training.

Ricciotti *et al.* (2017) piloted a resident-as-teacher video-based training toolkit to train residents in teaching skills in clinical scenarios. Residents from two teaching hospitals watched "Clinical Teaching Skills" and "Effective Clinical Supervision" videos from the toolkit and completed a self-study guide. The residents were observed for their clinical teaching skills and evaluated. The training toolkit was associated with improvements in the teaching skills of residents in clinical settings.

The benefit of online video learning materials for a simulation laboratory course in cohorts of students was evaluated by Botelho (2019) using an analytical approach and customised online video clips in a fixed prosthodontics course to support student teaching in a simulation laboratory. The online content included PowerPoint presentations, simulation laboratory demonstrations, student case consultations and worksheet debriefings. Feedback of the students on online learning resources was encouraging. The students consistently reported that videos facilitated considered valuable results for a variety of learning needs.

Similarly, Atik, Gorucu-Coskuner and Taner (2020) analysed the results of a live-video based demonstration on the dental student's performance of orthodontic vestibular arch wire bending exercise and evaluated the students' interpretations of the technology. All students were first-timers for orthodontic wire bending and were divided into two cohorts randomly. The conventional demonstration was delivered to cohort one, while a live-video based demonstration was delivered to cohort two; both cohorts were evaluated for their performance before beginning the exercise and later. Though there were no significant differences in the students' bending scores between the two cohorts, cohort one wished to rewatch the demonstration compared to cohort two. The authors concluded that live-video-based demonstrations were as effective as a conventional live demonstration for orthodontic practical teaching.

Behaviour management is a crucial element for a successful paediatric dental treatment and is an essential component of the dental undergraduate curriculum. Kenny, Alkazme and Day (2018) studied videos as a supplementary teaching aid to conventional lectures and seminars to dental undergraduates before giving children local anaesthesia. Treating children is stressful for

beginner dental students, and hence two groups, interventional and control groups, answered a self-administered questionnaire to evaluate their confidence levels in administering local anaesthetic for children. The authors witnessed a statistically significant difference in confidence between the control and interventional groups immediately after the teaching intervention favouring the video group, i.e., the interventional group. An added advantage of video-based teaching with exposure to clinical practice is detailed learning and improving the clinical experience. The authors concluded that video-based teaching as an additional aid efficiently enhances students' confidence in local anaesthetic administration and other behaviour management techniques.

Nicol *et al.* (2005) evaluated the effect of staff training programmes on the oral health of elderly residents of long-term care institutions. First, elderly residents were examined, and baseline oral health was recorded. Then, the caretaker staff received intensive training in oral health care consisting of lectures, videos and clinical demonstrations. As a result, the oral health of elderly residents was reexamined and recorded at fixed time intervals, and a considerable reduction in oral health problems and overall improvement in denture hygiene was observed. Thus, the oral health training programme effectively altered and improved oral health in the elderly in long-stay institutions.

Clinical demonstrations in dentistry are an inseparable part of the teaching process, significantly progressing from preclinic to clinics, but with some inherent setbacks due to the limited visual access to the details and intricate steps of the treatment protocol. A study by Rystedt *et al.* (2013) investigated a course in endodontics, where the conventional clinical demonstrations were substituted by instructor-led seminars for the students to follow and

discuss relayed root canal treatment videos. Two cameras overviewed the procedure table, with a third camera connected to a surgical microscope for a magnified view of root-canal treatment procedures. Two group interviews were conducted to explore the students' opinions of this modification. The students revealed that the video-based seminars gave plenty of opportunities to combine theoretical and practical knowledge. The participants expressed that the video demonstrations' visualisation was in detail; instructors demonstrated clinical reasoning and the context; essential for better understanding. The interactive nature of these demonstrations also promoted discussions on the knowledge of a particular case and its variation that might be clinically challenging.

Dental photography is an integral part of the dental curriculum and practice; Kim (2020) created three concept videos on dental photography for teaching along with the basics concepts of photography and the operation of digital cameras. To study the effect of video-based demonstration and conventional education, whether it influenced the skills of 33 dental students in taking intraoral and extraoral photography and collected feedback using an electronic survey. Respondents gave positive feedback to the video-based demonstrations. The concept videos shown are found to be helpful supplementary aid for dental students to improvise their knowledge, understanding and clinical skills in dental photography. The authors concluded that multimedia resources could be a valuable additional chair-side teaching aid to improvise knowledge, experience and clinical skills.

Thilakumara *et al.* (2018) assessed dental students' knowledge, understanding, and practical skills, divided into two groups randomly and taught using live demonstration and video-based demonstration on arranging artificial teeth. The author considered some inherent

drawbacks in traditional procedural demonstration of teaching students the teeth arrangement technique: both groups' pre-test and post-test evaluations were conducted to assess their knowledge about teeth setting. After one week, students in both groups performed teeth setting, and a practical skills score was given. After the practical skills testing, a questionnaire evaluated the students' understanding of their teaching-learning techniques. The difference between the two group's mean pre-test scores was not significant. However, video-based demonstration, i.e., group two, showed an increase in mean post-test score compared to their pre-test score, which was statistically significant. In addition, their difference in the mean practical skills test score for both groups was not significant. Thus, the authors concluded that the video-based demonstration was equivalent to the live demonstration teaching the teeth setting skill. However, the knowledge, understanding and interpretation were better from the video-based demonstrations making it a better teaching aid.

Bazyk and Jeziorowski (1989) conducted a study to compare the effectiveness of video-recorded and live demonstration of a developmental evaluation to occupational therapy students. Students were assigned to the video-recorded or the live demonstration group randomly. The video-based demonstration group saw a 25-minute commercially available recording while the live group received the same instructor delivered demonstration. Following these demos, students were assessed for their knowledge of the reason and procedures of the evaluation method using a written pre-test and post-test. The students belonging to both groups gave feedback about their learning experience after the post-test. There was no difference in the test scores of both groups. Thus, the learning experience was good with both the methods, but

the live demonstration was preferred as interactive discussion and clarification of doubts was possible with the instructor.

De'Angelis *et al.* (2019) aimed to evaluate and compare the 25 most viewed laparoscopic appendectomy videos listed on YouTube, the most popular and preferred platform. The comparison and evaluation were made by three surgical trainees and three senior surgeons following specific guidelines for laparoscopic surgery videos (LAP-VEGaS) regarding surgical skills and performance, quality, and utility. Senior surgeons rated the videos more critically as compared to surgery trainees. The authors concluded that though Laparoscopic pre-existing videos on YouTube are regarded as practical and helpful educational tools, they are not sufficiently standardised and calibrated for educational purposes.

Lee, Seo and Hong (2015) evaluated the educational quality and value of laparoscopic cholecystectomy (LC) videos posted on YouTube. Viewers did not identify the differences in quality of videos, and YouTube videos created by tertiary centres displayed the most significant educational value. Therefore, the authors inferred that video with higher educational values can be promoted by actively standardising and selecting procedures for posting on social media platforms like YouTube.

Learning by watching procedural videos is currently a common practice of residents and specialists to prepare for surgical procedures. Mota *et al.* (2018) evaluated the importance of video-based learning by residents and specialists of different surgical fields using an electronic questionnaire using Google forms. The authors concluded that the majority of the surgeons had used videos to prepare themselves for surgery, and the most popular platform is YouTube. The

younger surgeons preferred YouTube and wished to have more didactic and narrative content in the videos, whereas senior surgeons gave priority to surgical skills, tips and tricks. The authors inferred that creating scientific and high-quality videos, easily accessible in video libraries, should be prioritised.

Gadbury-Amyot *et al.* (2014) conducted a pilot study examining whether digital gadgets such as tablets with procedural videos improved learning outcomes in a preclinical skills lab. Students were divided randomly between the experimental (tablet) and control (no tablet) groups. Evaluation by faculty revealed no significant differences between the two groups; however, fewer procedural mishaps were committed in the experimental group. In addition, students strongly perceived that the tablets and procedural videos enhanced their performance and self-assessment of their preclinical work.

Undergraduate courses in health education should incorporate social media in the classroom teaching for learners to collaborate and communicate with faculty, peers, and researchers worldwide, to provide the learners with career skills, and thus improvise their learning. However, the advantages of incorporating social media in these courses were not supported by sufficient research. Further research and more experience utilising social media for educational purposes might help in developing best practices. With enough evidence, universities will promote and support social media usage in teaching-learning. Also, the evaluation process in higher education institutions might have questions about learner's experiences using social media to understand the mechanisms and modifications necessary to utilise this new teaching resource better by using the various platforms available for learners in different fields.

Furthermore, learners and educators might motivate and encourage each other to use social media in classroom teaching. Thus, to promote their usage in classroom teaching, social media platforms might develop and update to adapt to this context with more advantages and fewer disadvantages. With this development, policies to support educators and institutions in adopting social media in teaching-learning might become a reality (Gualtieri, 2012).

Social media can be a transforming element in revolutionising education. The authors express that social media is an unrecognised and unexplored educational tool for both learners and educators. They further opine that if appropriate policies are available, social media will not only be an inexpensive and inevitable component of teaching and learning, but it will also promote communication and collaboration between health professions worldwide and integrate them as a family and enhancing their bond as a family (Bhola and Hellyer, 2016).

3.4 CONCLUSIONS

The above review of the literature highlights the previously established observations that videos are a helpful aid for self-directed learning. Recently, videos posted on various social media platforms are gaining popularity due to ease of accessibility and free content, with YouTube followed by Facebook being the preferred source. However, multiple studies show that students and surgical trainees need to be cautious when choosing YouTube videos to learn clinical and surgical skills. Surgical residents suggest that medical universities should share their own standardised and calibrated surgical videos, thereby assuring the quality of the delivered information due to the popularity and free access to procedural videos, especially posted on YouTube. Similarly, various studies on YouTube surgical videos suggest a need to upload credible,

reliable and complete videos made by experienced surgeons accessible to surgical residents compared to the present deficient content.

Learners can develop their clinical skills, knowledge and performance by tapping into this promising resource of comprehensive procedural videos.

4 THE METHODOLOGY

4.1 INTRODUCTION

A research methodology provides an outline for collecting and analysing data (Cohen, Manion and Morrison 2007). The section will explain the research design, the sample, data collection, the data analysis process and the ethical considerations.

4.2 RESEARCH DESIGN

Qualitative and exploratory research was conducted to understand how dental educators use videos of operative procedures hosted on social media platforms. The study was carried out under constructivist and connectivist learning theory (Siemens, 2005). Opinions and experiences of the educators are given importance, and the research design was adopted to provide opportunities for participants to express their understandings so that the researcher can accurately interpret answers. Finally, the research design should be straightforward so that the observers can understand research from an initial question to a conclusion with clearly grasping methods and analysis (Blandford, 2013).

4.3 SAMPLING AND SAMPLE SIZE

Following are the criteria for selecting the samples

1. Educators from different subjects of dentistry from various dental colleges to represent randomisation among educators.
2. Dental educators with four years of experience in teaching were selected.

The researcher selects ten dental educators for the study through purposive sampling. In exploratory research, the sample size depends on the questions enquired,

the data collected, the analysis in progress and the resources (time and finances) required for the study (Merriam, 2009). If no new information is found, sampling can be terminated due to redundancy (Merriam, 2009).

Sample size in qualitative research typically depend on thematic overload, which refers to the point at which no new thematic information is collected from participants (Guest, Bunce and Johnson, 2006; DeJonckheere and Vaughn, 2019), and sample size determination is a complex process that revolves around the interviews, data collection and analysis. In this study, the investigator advanced with data collection and reflected on the data collected immediately. Such reflections permitted the researcher to include new questions for the next participant, enabling the researcher to decide for data saturation. In addition, data saturation is used to terminate data collection by the researcher, thereby determining the sample size. In this study, the researcher achieved data saturation after nine interviews.

4.4 DATA GENERATION

In this study, semi-structured interviews were used to generate the data. This method comprises a discussion between researcher and participant, guided by a suitable interview process and accompanied by follow-up enquiries, probes and comments (DeJonckheere and Vaughn, 2019).

The main objective of semi-structured interviews was to collect opinions and experiences of dental educators related to operative procedures present on social media platforms.

A semi-structured interview involves a list of prepared guiding open-ended questions (Appendix 4) enhanced after every interview feedback and response. Two pilot semi-structured

interviews were conducted before the actual study to precede the current research, which helped the researcher control the interview time and practice the interviews (DeJonckheere and Vaughn, 2019).

4.5 PARTICIPANTS AND SAMPLING METHOD

Initial contact with the participants was either by email or telephones, following which the information page (Appendix 2) and consent form were sent to the participants. After obtaining informed consent (Appendix 3) for the research, the participants were informed of their selection, the potential length of interview time and thanked. The schedule for the interview was set using online Zoom (Zoom Video Communications, Inc., San Jose, CA, USA) with recording on our local personal computer. Participants were reminded to check internet connectivity and were informed to have good internet connectivity for the interview time, and the researcher ensured that there are minimal disturbances to avoid interruptions (Lobe, Morgan and Hoffman 2020). At the beginning of the interview, the researcher reminded participants that they could refuse to answer or withdraw from the study at any time (Lobe, Morgan and Hoffman, 2020). All interviews were recorded, labelled and stored for data analysis. Video recording helped in capturing everything communicated, including nonverbal behaviour, and it is well-preserved for analysis. Also, the researcher paid attention to the recorded video for ways to improve the questioning technique (Merriam, 2009). Each interview lasted for 30-45 minutes on average. After every semi-structured interview, the researcher reflected on the process and content, which helped the researcher to reflect and make the necessary improvements for the following discussion (DeJonckheere and Vaughn, 2019).

4.6 DATA ANALYSIS

Data analysis in a qualitative study can be carried out simultaneously with data collection. Ongoing data analysis can help to process the data, which can be blurred or repetitive. Research at the end of large volumes of data can be tedious.

The data were analysed systematically through thematic analysis (Kiger and Varpio, 2020), following a framework on qualitative data analysis (Srivastava and Thomson, 2009). Thematic analysis helps analyse data for qualitative research that involves probing across a data set to code, analyse, and identify the repetitive theme (Braun and Clarke, 2006).

Framework analysis is based on the observation and accounts of the participants with change or addition or amendment throughout the research with the methodical treatment of the data (Srivastava and Thomson, 2009). According to critical topics and themes, the collected data is sorted through, recorded, and organised in the analysis stage. The framework analysis (Appendix 5) describes five important steps of analysing qualitative data: transcription of the interview records, managing, familiarisation and coding with the data and lastly generating themes (Lacey and Luff, 2007; Creswell and Poth, 2017).

4.6.1 TRANSCRIPTION OF THE INTERVIEWS

The labelled recorded interview data was then added onto an online software platform (Office365) for transcription. The interviews are transcribed verbatim. The researcher renamed each interview as an alphabet for each participant and a number sequence for the interview. All the transcripts were listened to many times and verified and corrected.

4.6.2 ORGANISING THE DATA

The generated transcripts are downloaded and saved for data analysis. The transcribed data remains stored without any identifications of the participation. All stored data will be deleted once the research is finalised.

4.6.3 FAMILIARISATION

Refers to the process in which the researcher becomes familiarised with complete or partial transcription by reading and re-reading the transcripts (Srivastava and Thomson, 2009). This process enhances the quality of the data analysis process, and the researcher achieved an overview of the transcripted data (Richie and Spencer, 1994). Furthermore, by familiarising with the data, the researcher was able to identify the principal codes and themes of the data.

4.6.4 CODING OF THE DATA

From the familiarisation stage, the researcher starts reading the transcript, codes allotted to a particular finding. Then, transcribing the interview transcript into codes, assigning symbols to various data parts to quickly recover specific data pieces. Codes can be single words, letters, numbers, sayings, colours, or combinations (Johnny Saldana, 2015). The set of notes and codes developed can be very helpful during analysis and writeup to retrieve the data from interviews (Lacey and Luff, 2009).

The coding was completed manually in MS word by highlighting and identifying single words, phrases, and sentences in different colours. Codes allotted were rechecked for any misinterpretation or missed data.

4.6.5 GENERATION OF THEMES

A theme is a 'patterned response or meaning' (Braun and Clarke, 2006) that originates from the data connected to the research question(s). Checking the coded transcripts resulted in wide-ranging broad themes. For generating themes, (Varpio *et al.*, 2020) explains the researcher should go through examining, merging, associating, and charting how codes relate to one another. Next, the researcher examined the codes for similar patterns, followed by grouping these similar pattern codes into a cluster, thereby recognising themes in the data.

Themes were reviewed to check if the codes were appropriately identified, and confirmation was achieved for sufficient similarity and consistency among codes under a theme (Braun and Clarke, 2006). Themes were finalised after the complex iterative process of re-reading and revising codes and themes.

4.7 ETHICAL AND RIGOR CONSIDERATIONS

Researcher obtained ethical clearance (Appendix 1) from Keele ethics committee approval (School Student Project Ethics Committee)**.** Participants were informed about the research format and purpose. The researcher-maintained respect and showed sensitivity towards participants during the entire interview schedule regarding data handling and anonymity of the interviewee's information. The researcher's local advisor confirmed the data design decision, data generation methodology, interview protocol, data analysis and all the steps of methods to ensure trustworthiness in the study.

5 RESULTS

5.1 THEME ONE - OPINION ON SOCIAL MEDIA PLATFORMS

On interviewing participants about opinions on social media platforms, participants mentioned they used social media platforms for personal and professional reasons. This was enquired to know the understanding of the participants about social media platforms and their uses. Identified opinions were grouped into the following subthemes, which were finalised into theme one.

Sub-Themes

5.1.1 Communication

Participants explained they use social media platforms to communicate with relatives and friends. Social media platforms and resources are readily available, and it has become easy to interact and socialise.

"Communicate in real-time, so one such use is putting the families together" A1

"Human interact with each other, a benefit to socialise and to professionally collaborate" B2

5.1.2 Adjuvant in online teaching

Along with personal use of social media, participants mentioned they are using social media platforms for their academic purposes for online teaching and individual clinical learning or updating their knowledge. In addition, one of the participants mentioned using social media platforms for mentoring students.

"Mentoring students and for my class students because we are taking online classes sometimes if the online classes have any issues or I want to explain more, sometimes I need to communicate as an adjuvant also to my major teaching through online, so I'm using social media for all these different purposes." A1

5.1.3 Entertainment

Along with using social media platforms for communication and academic purposes, participants also highlighted the use of social media platforms for entertainment and relaxation.

"Mostly it is for the personal and the academic use, in addition to getting, of course, the entertainment or the relaxation part out it." A3

5.1.4 Content in social media

Participants highlighted there is no control of content on social media platforms, and a person can post any content without being regulated. One of the participants mentioned there is a scope of improvement in social media content.

"Social media is a boon and bane because I feel you can collect the wrong information. Or you can collect the very right information because there are lots of providers providing information, and you don't know what the right thing is?" A5

5.2 THEME TWO – LEARNING THROUGH VIDEOS

Participants mentioned videos are an excellent tool for communication and learning. Furthermore, videos help overcome the local limitation of resources, and students can learn innovations performed somewhere else in the world.

Sub-Themes

5.2.1 Repeated viewing

Participants believed that videos help learners repeat watch the procedures or stop and continue the procedural videos, and learners can watch the videos at their convenient time.

"It helps them to repeatedly see the demonstrations so that they can go through again and again without the demonstrator" A4

5.2.2 Recording

Some of the procedures which may not be shown on patients can be video recorded on manikins and shown to learners. Videos can be edited in such a way to show every fine point of the procedures with a good explanation.

"I think it's an exceptional tool. I believe videos convey a lot because just instead of speaking, if you can portray what you do and how you do it, it makes a lot of sense, and they can grasp very well. "A5

5.2.3 Impactful

Participants believed that videos are always available for learners' access and videos may project a comprehensive picture of a particular procedure. In addition, visual procedural videos may create long-lasting memory in learners. Finally, one participant believed that videos are helpful for every kind of student, particularly for mature learners.

"Videos are very good, or it will have a long impact on the student" A6

"Short videos, especially that is educational or informative…." A8

5.2.4 Difficulty

Participants believed that long procedural videos could not maintain a learner's attention, and short duration videos were suggested. Participants mentioned that procedural video

creation is very tough and putting them in to correct context and making them available for learners is commendable.

"What we just know when we start making our video, we know how difficult it is, so we should appreciate the hard efforts" A9

5.3 THEME THREE - OUTLOOK ON OPERATIVE PROCEDURES HOSTED ON SOCIAL MEDIA PLATFORMS

Sub-Themes

5.3.1 Evidence-based

Participants thought that operative procedures posted on social media platforms could have inaccurate content and are not evidence-based. In addition, standard protocols may be missing with no follow-up or explanation.

"The platforms cannot control which are good and which are bad so, but as a learner, they have to be in a position to learn from the right things" A1

"Our duty now is rather than saying everything is wrong to get the positive out of it and try to avoid whatever is not useful" A3

5.3.2 Amending content

Content may have inaccurate information, the study participants were suggesting editing and using the relevant portions of the operative procedures posted on social media platforms for the teaching.

"I don't know if all these procedures that they see are practically possible in our country on our patients" A5

"You might show that video from the particular university, but it's also important to complement or supplement it with your own clinical experience or, you know, a supplement. Add on from your practice "A6

5.3.3 Identifying the right content

Participants suggested short procedural videos with appropriate background music and subtitles. One participant suggested educators should analyse the videos before recommending the most helpful content to the students. Participants thought that reputable university resources worldwide are a better source of operative procedural videos than individual social media accounts.

"The video is far more influential in getting the student to try out something new right then and there rather than we are trying to coax them, and it seems very interesting and the minute they see they all want to try it, so that's how it is better" A6

"We do have to go through a trial-error process, so the same thing goes with video learning." A9

5.3.4 Educators' reasons for use

Participants agreed they are watching these operative procedures posted on social media platforms and incorporating them in their teaching. Participants quoted self-improvement as an important reason to watch these videos. They also mentioned that these videos might help understand a different point of view or better understand the procedure. One participant discussed very limitedly or nil use of operative procedures posted on social media platforms.

"I want to see some of those videos to check if it's related with the clinical procedures or if it's related with one of the teaching contents to see how it is being presented" A3

"For seeing different technical skills, if I see a technical video, I would like to see how is this particular clinician implementing" A6

5.4 THEME FOUR - INCORPORATION OF PROCEDURAL VIDEOS HOSTED ON SOCIAL MEDIA INTO TEACHING

Participants mentioned operative procedures hosted on social media platforms could be included in the curriculum. One of the participants said that the participant's learning would be enhanced by watching these videos, and it can be of great help for students in education.

Sub-Themes

5.4.1 Inclusion into the teaching

Participants believed that Operative procedures posted on social media could be included in the teaching via educators only in addition to the core curriculum. Therefore, operative procedures posted on social media in the curriculum can be a hidden curriculum.

"it's a good thing to have it, but educators should know exactly which is a good material to learn, but definitely presence of this material in the social media is of great help to the learners" A8

One participant was clear, mentioning we should use our own created videos instead of these readily available videos.

'If you're going to put it on the platform where all the students from your university want to access, it's something you need to prepare and put forth, but you just can't take up ready-made content' A5

5.4.2 Availability of variety

Participants believed that variety and alternate clinical procedures are available on social media; this may help the educator show all these procedures to learners, which may not be possible locally with limited resources.

"We can cover variety of procedure" A8

5.4.3 Continuous observation

Operative procedures posted on social media can be conveyed more swiftly; needs continuous observation due to concern about social media's security and privacy issues, so learners and educators need to take their precautions. If required, these videos also require updates regularly.

"Not all the social media videos can be taken as an E-learning process. We have to monitor the content before it is officially into your E-learning process" A5

5.5 THEME FIVE - LEARNING FROM OPERATIVE PROCEDURES POSTED ON SOCIAL MEDIA

Participants had an opinion that both educators and students can learn from operative procedures posted on social media.

Sub-Themes

5.5.1 Clinical skills training

One of the participants believed that operative procedures posted on social media could make clinical skills concepts more transparent by adding value to the core teaching. Another participant mentioned clinical skills involve the psycho motor skills; learners can learn them by themselves and cannot replace the essential skills training.

The quality of videos present will influence learners. All videos may not be helpful for learning. A variety of procedures existing can be added advantage to core teaching.

"It is going to give them an edge over a person who is not watching the videos" A3

5.5.2 Online Difficulties

Participants believed that online advertisements and marketing links during the watching could cause a distraction for the learners, increase screen time for the learners, and learners may view unrelated content on the internet. In addition, for educators retrieving a good content operative procedural video from social media can be very tasking and storing these videos is also tricky.

"The time spent on this platform is higher because sometimes we need to research and get the suitable material "A7

5.5.3 Small duration videos

Participants suggested small videos will be of more help in teaching compared to long-duration videos. It was mentioned students might have less attention span, so that long procedural videos may become dull. One participant said that small videos showing every step of the procedure help the learner perform things better.

"All videos should not be more than 5 minutes specifically. And if I'm choosing a brushing technique and an on average of 3 minutes" A6

5.5.4 Curriculum considerations

Participants mentioned that operative procedures posted on social media recommended by educators could be included in the teaching curriculum. One of the participants thought that senior faculty should critically appraise the videos' content and suggested reviewing the content if required, edit and use the videos. Another participant indicated that valid operative procedural videos with appropriate references and scientific evidence could be included in the curriculum. Participant also suggested that online teaching can become more effective by having readily available operative procedural videos from social media platforms. One participant indicated that only rare videos or cult procedures need to be involved in the curriculum. Another participant mentioned we should focus only on our procedural videos rather than videos from social media platforms.

"What content is not particularly applicable in our setting, we need to distinguish maybe some content is correct, but we are applying it and some content, may be practically not possible to apply." A8

5.6 THEME SIX - STRENGTHS AND SHORTCOMINGS

Sub-Themes

5.6.1 Conflict of information

Participants suggested analysing every video individually to filter any conflict or inappropriate clinical content present in the videos before deciding the content for the curriculum. Educators should convey the gap between the information in the videos and actual

practical procedural performance. The scope of the videos should be gradually increased in difficulty while learners are learning progressively.

“Use it with a with a good intent with no commercial benefits from that video for teaching purpose” A5

“We do not have that system of censoring the videos which are eligible.” A3

5.6.2 Create and update more content

After watching operative procedures posted on social media, participants believed that learners might create better future videos and create or update more online content. In addition, learners can acquire more skills of the same procedure, which gives a particular advantage over other learners.

"Will trigger their mind and probably over some time they might create better videos with better content and probably they might keep updating the content" A5

5.6.3 Problems

In the participants' opinion, the operative procedures posted on social media have privacy issues by displaying patient details. In addition, videos may have been associated with copyright issues due to originality in the open-source platforms and the possibility of misusing the videos by copying. Finally, one participant mentioned videos on social media platforms could be for marketing the products, which may raise conflict of interests.

"Platforms are not reliable in terms of security issues, but they're also working towards it, and we need to go with that. But we need to take our precautions in using this "A1

5.6.4 Feedback and reflection

Participants thought that learners get the opportunity to discuss and reflect by comments and messages on social media with a clinician or the video creator. In addition, participants suggested that learners may start to critique and review the content of the videos, thereby improving the social interaction, which may lead to online collaboration to create more content.

"So aesthetically, you know, so appealing that the content is sometimes misinformed. So, I think the students are too naive to understand that. So those things have to be kept in mind when we are exposing them to these educational videos " A6

“Student review about it or express their views after watching the videos” A8

5.6.5 Benefits to educators

Participants thought that operative procedures posted on social media enhance the work of the educators and, at the same time, adds more responsibility. One participant mentioned that operative procedures posted on social media are helpful to educators to spread knowledge, but they must be used as supplementary or complementary.

"Actually, rather than decreasing the load, this may be putting more responsibility onto the educators." A3

".it will become easy for the educators. But without monitoring these videos, obviously we don't know how the students are going to take up these videos because not all of them are done by you…" A2

General comments in the study by A8

"..I'll just say there are two things that I liked about this particular interview."

"It was so well-paced."

"I was allowed to express my opinions in full length and breadth with sufficient time."

General comments in the study by A6

"It was a great experience because it's very reflective."

6 Discussion of the study

6.1 INTRODUCTION

The present qualitative study aimed to understand the opinions and experiences of dental educators in using the videos of operative procedures hosted on social media platforms. In addition, this part of the dissertation discusses the study results supported by current literature related to dental educators' opinions and experiences on operative procedures hosted on social media platforms.

6.2 OPINION ON SOCIAL MEDIA PLATFORMS

This study further reinforces the well-known fact that dental educators use social media platforms for their personal reasons to communicate with relatives and friends in real-time who are far away. Social media platforms also play an essential role in individuals' entertainment and relaxation. Social media platforms have helped connect people from different parts of the world since they are readily available and straightforward to use, just one of the reasons it is so popular, as observed in this study. The participant interviews reflected that they could also use social media platforms for academic purposes like learning, teaching and mentoring as observed in the literature (von Muhlen and Ohno-Machado 2012; Arnett, Loewen and Romito 2013; Parkinson and Turner 2014; Guckian *et al.* 2019). Social media platforms help educators update their clinical learning and subject information following the study by Bhola and Hellyer (2016).

This study's observations follow previous studies that social media has no control of content, and anyone can post unregulated content, which anyone in the world can access at their fingertips (Parkinson and Turner 2014). As rightly said by one of the participants that *"Social*

media is a boon and bane, "i.e., social media platforms have both positive and negative aspects, users' need to caution themselves, and there is an opportunity for improvement in social media content.

6.3 LEARNING THROUGH VIDEOS

In general, videos in education are an excellent tool for communication and learning. This inference can be almost considered universal (Hurtubise *et al.*, 2013; Dong and Goh, 2015; Brame, 2016), and the same was the opinion of the research participants. It was observed by the researcher that the participants mentioned that the videos help overcome the limitation of resources locally and provide an opportunity for students to learn procedures performed somewhere else in the world, as seen in other studies (Dong and Goh 2015; Trelease 2016). Similar to findings of Dong and Goh (2015); Aldallal, Yates and Ajrash (2019); Katz and Nandi (2021), the present study also found that videos permit repeat watch or pausing the procedural videos with the added benefit that learners can watch the videos at their convenient time. The researcher believes repeated watching can visually improve students grasp of the procedures and minimise mistakes. This phenomenon is explained by Livant (2007) as “Working memory” that creates SCHEMA, which helps create long-lasting memory in learners similar to as seen by other researchers. On the other hand, videos generally carry complex concepts in a given amount of time, and participants expressed that simplifying the procedures for the audience using sound and motion pictures would be immensely helpful (Hurtubise *et al.* 2013).

Similarly, in health education, complex or rare clinical guidelines that cannot be demonstrated on live patients; can be video recorded to show every step of the procedure and its details with a proper explanation for learners. In health education, live patient procedure

demonstrations can be complex due to limited visibility to all the learners (Aragon and Zibrowski, 2008), so clinical procedural videos display a comprehensive picture of a procedure and are always available for anytime access for learners in their own convenient time. One participant mentioned that creating an excellent operative procedural video requires a lot of time, effort, and sufficient skills, as observed in the study of Dong and Goh (2015). Short videos with good visual effects and sounds are better since current students tend to have a short attention span (Prober and Khan 2013; Roland and Balslev 2015; Brame 2016; Delgaty, Fisher and Thomson 2017; Ricciotti *et al.* 2017). The researcher feels that long videos like long demonstrations can cause information overload and difficulty in retention. So procedural videos need to strike a balance between being concise and comprehensive to be an effective teaching and learning aid.

The present study had observations in agreement with available literature on videos and learning.

6.4 OUTLOOK ON OPERATIVE PROCEDURES HOSTED ON SOCIAL MEDIA PLATFORMS

A unanimous opinion was observed amongst the participants that operative procedures hosted on social media platforms may or may not be evidence-based and can have inaccurate content. This observation is in agreement with a study by Bhola and Hellyer (2016). One of the participants discussed that social media videos might show clinician's individual choices without standard protocols with no follow-up or compromised outcome, as stated in the De'Angelis *et al.* (2019) study. As a whole, if videos from social media may not suit teaching, content from these social media sources can be edited as required, and relevant portions can be used in education.

Participants highlighted the presence of inappropriate background music, unnecessary introduction, flashy visual effects and catchy unscientific subtitles in videos on social media platforms. Therefore, educators need to caution themselves in choosing these videos and reasonable explanations if they incorporate them into teaching (Smith 2014; Madden *et al.* 2016). At the same time, participants believed that learners need to communicate with educators regarding videos present on social media and self-critique them after watching and before updating their clinical skills (Dong and Goh 2015). This finding can be explained by the fact that educators are aware of the teaching requirements and learning outcomes, thus know to select procedural videos containing the right content in alignment with the learning objectives. On the contrary, learners might not be aware and unable to distinguish between right and wrong content, especially if these procedural videos posted on social media are their primary source of learning.

Reputable university websites or journal resources present worldwide were also mentioned by participants as a good source of operative procedural videos compared to videos present on social media platforms (Madanick 2015). Participants agreed that they are using videos present on social media platforms to learn and incorporate them in teaching their students. One of the participants mentioned they use these videos to understand a different point of view if present. At the same time, one participant said social media videos might not add any new information or sometimes give wrong information. This difference in opinion might be due to the personal experiences of the participants after using procedural videos on the social media platform. A similar difference of opinion has been observed by Hanson *et al.* (2011).

6.5 INCORPORATION OF PROCEDURAL VIDEOS HOSTED ON SOCIAL MEDIA INTO TEACHING

Participants agreed that current generation learners are well versed with the social media platforms (Sandars and Morrison 2007), so including operative procedures hosted on social media platforms into the teaching is possible as they enhance the learning (Mysko and Delgaty 2015; de Peralta *et al.* 2019) and it can add supplementary core teaching material in education. At the same time, one participant disagreed and said using self-produced videos will be better. Another participant suggested the use of the appropriate content videos selected by the teaching faculty themselves as, in their personal experience, it saves a lot of time.

The researcher and participants believed that operative procedures posted on social media could be included in the teaching once educators have a clear plan to approve the correct content for education, which can be in addition to the regular teaching similar to findings in study by Hanson *et al.* (2011). In addition, the team approach to reviewing the content of the procedural videos can lighten the individual workload (Lu *et al.* 2020). Participants also mentioned universities and colleges could have social media policies to inform learners about social media platforms in the teaching.

All participants reported operative procedures posted on social media to have privacy issues by displaying patient details and videos might have been associated with copyright issues due to originality in the open-source platforms and the possibility of the misuse (von Muhlen and Ohno-Machado 2012) of the videos by copying.

Most of the participants thought that social media platforms might offer some short videos with good visual effects and appropriate background sounds, which are better to use in

teaching since current students tend to have a short attention span, as agreed by Hollinderbäumer, Hartz and Uckert (2013) and Delgaty, Fisher and Thomson (2017). Participants and researchers believe operative procedures posted on social media can be additional or supplementary teaching outside college hours (Delgaty 2013). One of the participants thought that if time and resources are available, educators can be more effective by creating their procedural videos in their local settings.

Participants mentioned that complex, rare and alternate operative procedures from social media could be added to teaching. Otherwise, they are not feasible due to time and resource constraints (McAndrew and Johnston 2012). Different variety of clinical procedures can help learners to have a better understanding. Social media videos can convey messages more swiftly, and participants mentioned that sometimes they shared video links with learners to watch these videos. So these links and video contents need continuous observation due to concern of the security and privacy issues of social media (Delgaty, Fisher and Thomson 2017), and if required, these videos and their links require updates regularly.

6.6 LEARNING FROM OPERATIVE PROCEDURES POSTED ON SOCIAL MEDIA:

Participants mentioned that learners have access to open resources present on social media and the internet, and it is better to guide them to choose suitable videos with acknowledgements to the creators. All participants mentioned that learning clinical skills is possible from operative procedural videos posted on social media, as Prober and Khan (2013) discussed. Participants said operative procedures posted on social media could simplify concepts in clinical scenarios involving psychomotor skills (Botelho 2019).

One participant mentioned that the learner could only learn clinical skills by themselves and videos cannot replace the essential skills training. This is in accordance with the studies by Thilakumara *et al.* (2018); Atik, Gorucu-Coskuner and Taner (2020) who have this interesting finding that though the knowledge-based score improved the clinical skills like orthodontic wire bending and artificial teeth arrangement, practical scores were not different significantly. So, these procedural videos posted on social media can be an adjunct to conventional teaching for better knowledge and understanding only and not improve clinical skills.

The researcher and participants believed that the quality and variety of videos present would influence learners, and all videos may not be helpful for learning (Guckian *et al.* 2019). Operative procedures posted on social media allow learners to stimulate curiosity with the convenience of anywhere or anytime watching the realistic operative procedures(Pluck and Johnson 2011; Dong and Goh 2015). Similar to the findings by Mysko and Delgaty (2015), participants agreed introducing social media videos in the teaching may encourage interaction and collaboration outside of the colleges. This finding is due to the fact that social media platforms are spread worldwide, and learners who are shy in the classroom might be pretty active on social media platforms due to relative anonymity.

6.7 STRENGTHS AND SHORTCOMINGS

Social media platforms pose several risks like privacy and security issues; participants discussed media may display patient details and pose security issues to the learner. In addition, similar to von Muhlen and Ohno-Machado (2012), participants agreed videos might have copyright issues and possibly misuse the videos by copying.

Participants also mentioned online advertisements and marketing links during the watching of online videos could cause a distraction for the learners, as also noted by Guckian *et al.* (2019). In addition, distractions may increase screen time for the learners, and learners may end up viewing unrelated content on the internet (Gualtieri, 2012). Also, one participant highlighted that videos on social media platforms could be for marketing and promotion of the products, which may raise conflict of interests. This is especially true with recent facts being revealed that social media platforms like Facebook have been sharing personal details of their users, and thus previously searched products and links might start popping up during these procedural videos distracting these young learners.

Participants noted that for educators to retrieve a good content operative procedural video from social media can be very tasking, and storing these videos with regular updates is also tricky. In accordance with the study by Greysen, Kind and Chretien (2010), participants note that educators need to analyse every video individually to filter any conflict or inappropriate clinical content present in the videos. These observations signify that educators, especially senior educators are better in actively monitoring the content, filtering and selecting the procedural videos from social media platforms. This is added responsibility of the educators themselves.

Participants mentioned educators need to make sure the videos included in the teaching matches the local needs and necessities; they also said it might not be worth showing videos where procedures cannot be performed locally by learners due to the unavailability of resources seen in the videos. One of the participants said in the Covid-19 pandemic like situation, limited clinical work and online teaching can become more effective by using readily available operative

procedural videos from social media platforms. This observation is in alignment with a recent study during the Covid-19 pandemic by Katz and Nandi (2021).

Participants also note that educators should convey the gap between the information in the videos and actual practical procedural performance, also highlighted by Sherbino and Frank (2014). This might be due to the fact that teaching faculty have a better understanding of learning objectives and outcomes as compared to learners. Hence, the educator's help and guidance might help in making these young learners' better consumers. Finally, participants suggested that the procedural videos used in teaching should gradually increase in difficulty with novice learners in mind.

After watching the operative procedures posted on social media, learners may create better videos in future (Dong and Goh 2015) and create or update more online content (El Bialy, Jalali and Abood 2014). Thus, learners can acquire more skills of the same procedure, which gives a specific advantage over other learners. This advantage might be explained due to the increased confidence by watching these psychomotor skills demonstrated in videos time and again thus being better prepared to perform these skills.

Social media platforms benefit both learners and educators; many advantages are discussed in the previous sections. However, mainly participants mentioned that learners could discuss on the social media platforms and reflect on the procedures they see by comments and messages with the clinician or the video creator (Parkinson and Turner 2014). In addition, participants and researchers agree that learners progressively start to critique and review the content of the videos themselves, thereby improving the social interaction, which may lead to an

online collaboration with other clinicians to create more content (Cheston, Flickinger and Chisolm 2013; El Bialy, Jalali and Abood 2014).

Most of the participants mentioned that operative procedures posted on social media enhance the work of the educators and, at the same time, adds more responsibility. Therefore, operative procedures posted on social media are helpful to educators to spread knowledge, but they are either supplementary or complementary to conventional teaching, as mentioned by Turkyilmaz, Hariri and Jahangiri (2019).

Participants mentioned that educators' training in using social media platforms improves understanding and application in teaching. One of the participants discussed that universities or management's endorsements supporting faculties and introducing policies would lessen the hurdles for educators' acceptance of social media into their courses, similar to Gualtieri's (2012) suggestion. Researchers and participants discussed that institutions could involve educators with robust social media knowledge to guide roles to lead social media educational changes, as highlighted by Katz and Nandi (2021). One of the participants mentioned the need for the regulatory or review body to control the operative procedures posted on social media platforms, making it easy for educators to use the content for their teaching. This is in accordance with the Madanick (2015) study findings. This interesting improvisation for the future development of social media posted videos might genuinely make it possible to include this potential resource officially and utilise it to its optimum.

6.8 RESEARCH IMPLICATIONS

Social media platforms are mainly helpful for communication, and there is no control over posted content. Social media regulation policies overlooking entire health education content can be very useful. Operative procedure videos present on social media platforms are a valuable tool in clinical skills training, but they can only complement conventional teaching and cannot substitute lectures, textbook learning, demonstrations, and pre-clinical skills training with simulation. Evidence-based videos of operative procedures hosted on social media platforms, universities and peer-reviewed journals with authentic content are a good source for teaching clinical skills. Videos of operative procedures hosted on social media platforms can be included in dental clinical skills teaching and can reduce the educators' burden but add more responsibilities.

6.9 LIMITATIONS

Being only one researcher with a day teaching job and in addition, conducting a qualitative semi-structured study for the first time could have been a limitation. Increasing the number of researchers in this study and dedicated research time would have permitted more wide-ranging data accuracy and lessen the time constraints. Even though the study design allowed good sample representation, the number of participants interviewed in the study was less, and the study design with a larger sample size would have provided more inclusive data. Before the primary semi-structured interviews, a survey could have been used to extract more information on social media use and its policy. Online interviews are easy to conduct at the same time; interviews were dependent on a good internet connection. The researcher did face a drop in the quality of the internet, and many times, participants reconnected the meeting. Due to

online interviews, participants' non-verbal cues were unreliable and not analysed, and non-verbal cues analysis would have provided an understanding of the emotions attached to their views. The researcher felt that if the participant is not native to English, this can add more limitations to the study.

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Appendix 1: ETHICS APPROVAL

6th April 2021

Keele University

Dear Rachappa Mallikarjuna

Re: Application Ref 21-17

Title: 'How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences'

Thank you for submitting your ethics application to the School Student Project Ethics Committee (S-SPEC). Your project has been reviewed and I am happy to confirm this project has been approved.
Please note that you must inform us of any changes or deviations to the approved project.

Good luck with the research.

Best wishes,

Dr Clive Gibson
S-SPEC Chair

Keele University, Staffordshire ST5 5BG, UK
www.keele.ac.uk +44 (0)1782 732000

8 Appendix 2: INFORMATION SHEET

INFORMATION SHEET

Study Title:
'How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences'.

Invitation
You are being invited to consider taking part in the research study - **'How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences'.**
This project is being undertaken by Dr Rachappa Mallikarjuna.

Before you decide whether or not you wish to take part, it is important for you to understand why this research is being done and what it will involve. Please take time to read this information carefully and discuss it with colleagues if you wish. Ask us if there is anything that is unclear or if you would like more information.

Aims of the Research
The objective of the study is to understand the experiences, choices and outcomes of dental educators in using the videos of operative procedures hosted on Facebook, YouTube, Instagram and other social media platforms for learning clinical skills and its alignment with the learning.

The research may help to understand the connection between the social media patient videos and teaching by educators.

Participation
You are free to decide whether you wish to take part or not. If you do decide to take part you will be asked to sign an informed consent via email.
You are free to ask any clarifications if required during any stage of participation and you are free to withdraw from this study at any time and without giving reasons.

Every possible effort will be made to hide the identities of the people under study. If a participant withdraws from study any data related to participant will be destructed systematically from all sources.

Procedures
Participants will be taking part in an interview and discussing their views. The interview will be digitally audio and video recorded for analysis purpose and participants identity will be hidden and not linked anyway to the data stored.
We will be using Zoom/MS Teams platform with audio video recording by the host. Participants are strictly prohibited to record any of the interview part.

Benefits
Hope to gain insight into the use of social media and that it might help educators. The outcomes will be shared with participants as well as at a conference or in a journal

Risks involved
With deidentifying, confidentiality and safe data storage foreseen risks are minimised. Additionally, participants will have access to outcomes.

Use of collected information

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Data is collected via interviews for qualitative analysis. Data collected will be deleted once the research work is approved and it will not be used for any future studies.

Access to information
Every possible effort will be made to hide the identities of the people during and after study. Data collected and stored in secure password protected disks along with online cloud storage and data will be coded and not identifiable anyway with the participants. Data will be accessed by researcher and supervisor for analysis. After completion of the study the data will be deleted from all sources.

I do however have to work within the confines of current legislation over such matters as privacy and confidentiality, data protection and human rights and so offers of confidentiality may sometimes be overridden by law. For example, in circumstances whereby I am concerned over any actual or potential harm to yourself or others I must pass this information to the relevant authorities.

Funding and organising the research
Self-Funded.

What if there is a problem?
If you have a concern about any aspect of this study, you may wish to speak to the researcher(s) who will do their best to answer your questions. You should contact *Rachappa Mallikarjuna* on *+96892629142 or* w7f28@students.keele.ac.uk. Alternatively, if you do not wish to contact the researcher(s) you may contact Jennifer van Wingerden at *j.vanwingerden@leeds.ac.uk*

If you remain unhappy about the research and/or wish to raise a complaint about any aspect of the way that you have been approached or treated during the course of the study please write to Nicola Leighton who is the University's contact for complaints regarding research at the following address: -

Nicola Leighton
Research Governance Officer
Directorate of Engagement and Partnerships
IC2 Building
Keele University
ST5 5NH
E-mail: n.leighton@ keele.ac.uk
Tel: 01782 733306

Contact for further information
If you have any queries about this study, you may please contact the Dr. Rachappa Mallikarjuna, Principal Investigator at +96892629142 or email to w7f28@students.keele.ac.uk.

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Appendix 3: CONSENT FORM

Keele University

CONSENT FORM

Title of Project:
'How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences'.

Name and contact details of Principal Investigator: Rachappa Mallikarjuna, PO Box 835 Mina Al Fahal Muscat Oman, +96892629142, w7f28@students.keele.ac.uk

		Please initial box if you agree with the statement
1.	I confirm that I have read and understood the information sheet dated ..... (version no .....) for the above study and have had the opportunity to ask questions	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time. In the event of withdrawal, and where it is possible, relevant data will also be withdrawn	☐
3.	I agree to take part in this study.	☐

_____	_____	_____
Name of participant	Date	Signature

_____	_____	_____
Researcher	Date	Signature

V1 08/02/2021

Keele University

CONSENT FORM
(for use of quotes)

Title of Project:
'How dental educators use videos of operative procedures hosted on social media platforms: a qualitative study investigating their opinions and experiences'.

Name and contact details of Principal Investigator: Rachappa Mallikarjuna, PO Box 835 Mina Al Fahal Muscat Oman, +96892629142, w7f28@students.keele.ac.uk

Please initial box if you agree with the statement

1. I agree for my quotes to be used ☐

2. I do not agree for my quotes to be used ☐

_____	_____	_____
Name of participant	Date	Signature
_____	_____	_____
Researcher	Date	Signature

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Appendix 4: QUESTIONS FOR SEMI-STRUCTRED INTERVIEW

1. Please tell me, what is your opinion on Social Media Platforms?

   To know participant's views on Social Media Platforms and their uses

2. What do you think about role of videos in education?

   To know participant's understanding about learning through videos

3. What is your opinion on operative procedures videos hosted on social media platforms?

4. What role operative procedures videos hosted on social media platforms play in your teaching?

5. What do you think about operative procedures videos hosted on social media platforms and Dental Education?

6. How can we incorporate operative procedures videos hosted on social media platforms into the dental curriculum/education?

7. What do you think about operative procedures videos hosted on social media platforms and student learning?

8. What do you think about validity and content of operative procedures videos hosted on social media platforms?

9. What effects do you think operative procedures videos hosted on social media platforms has on student communication and feedback?

10. What benefits/shortcomings would you expect in using in operative procedures videos hosted on social media platforms for your teaching?

11. What is your overall view on this topic?

12. Do you think I have missed out on any other questions related to this interview?

13. I will be conducting more interviews, do you have any other comments, suggestions or advice for me?

Appendix 5: SUMMARY OF DATA ANALYSIS