

## Use of the YouTube® Platform by Dental Students: Scoping Review \*

Uso de la plataforma YouTube® por los estudiantes de odontología: Revisión de alcance

Uso da plataforma YouTube® por estudantes de odontologia: Scoping review

María Luján Méndez Bauer <sup>a</sup>  
Universidad Francisco Marroquín. Guatemala, Guatemala.  
mlujanmendezbauer@ufm.edu  
<https://orcid.org/0000-0002-8429-8400>

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Stella de los Angeles Bauer Walter <sup>a</sup>  
Universidad Rafael Landívar. Quetzaltenango, Guatemala.  
sbauer@correo.url.edu.gt  
<https://orcid.org/0000-0002-7262-5136>

### ABSTRACT

**Background:** YouTube® is a popular platform available to anyone with internet access. It includes educational videos that allow dental students to use them as independent learning, so it is necessary to know how this platform is managed and the credibility of what it contains. **Objective:** To evaluate how the Youtube® platform has been used by dental students in their education. **Methods:** A scoping review was carried out with the PRISMA-ScR guidelines to explain the research questions: How has the YouTube® platform been used by dental students? How often is it used compared to other social networks? Do the students believe that the videos have scientific evidence? Inclusion criteria are specified as population (dental students), concept (YouTube® use), context (dental education), and types of evidence sources (peer-reviewed publication). **Results:** 239 studies were identified, of which twelve published between 2005 and 2022 were included, most of them with a cross-sectional design. YouTube® is one of the most used social networks and is mainly used by dental students to observe clinical procedures. There is a lack of confidence in the level of evidence found on the platform. **Conclusion:** YouTube® is used in dental education to facilitate learning, especially in clinical procedures. There is a distrust of the level of evidence that the videos contain, so it is recommended to analyze the quality of the material and that educational institutions increase the development of videos.

**Keywords:** dental education; dentistry; dental students; Internet; social media; social network; YouTube

### RESUMEN

**Antecedentes:** YouTube® es una plataforma popular y disponible para cualquier persona con acceso a internet. En ella se incluyen videos educativos que permiten a los estudiantes de odontología utilizarlos como aprendizaje independiente, por lo que resulta necesario conocer cómo es manejada esta plataforma y la credibilidad de lo que contiene. **Objetivo:** Evaluar cómo ha sido utilizada la plataforma Youtube® por los estudiantes de odontología en su educación. **Métodos:** Fue realizado un *scoping review* con las directrices de PRISMA-ScR para explicar las preguntas de investigación: ¿Cómo ha sido utilizada la plataforma YouTube® por los estudiantes de odontología? ¿Con qué frecuencia es utilizada con respecto a otras redes sociales? ¿Los estudiantes creen que los videos poseen evidencia científica? Los criterios de inclusión se especifican como población (estudiantes de odontología), concepto (uso de YouTube®), contexto (educación odontológica) y tipos de fuentes de evidencia (publicación revisada por pares). **Resultados:** 239 estudios fueron identificados, de los cuales se incluyeron doce publicados entre 2005 y 2022, la mayoría de diseño transversal. YouTube® es una de las redes sociales más utilizadas y los estudiantes de odontología la emplean principalmente para observar procedimientos clínicos. Existe una falta de confianza en el nivel de evidencia que se encuentra en la plataforma. **Conclusión:** YouTube® es utilizada en la educación odontológica para facilitar el aprendizaje, sobre todo en procedimientos clínicos. Existe una desconfianza del nivel de evidencia que los videos contienen, por lo que se recomienda analizar la calidad del material y que las instituciones educativas aumenten el desarrollo de videos.

**Palabras clave:** educación en odontología; educación odontológica; estudiantes de odontología; internet; medios de comunicación sociales; odontología; red social; YouTube

**Authors' Note:** <sup>a</sup> **Correspondence:** [mlujanmendezbauer@ufm.edu](mailto:mlujanmendezbauer@ufm.edu); [sbauer@correo.url.edu.gt](mailto:sbauer@correo.url.edu.gt)

## RESUMO

**Antecedentes:** YouTube® é uma plataforma popular disponível para qualquer pessoa com acesso à Internet. Inclui vídeos educativos que permitem aos estudantes de medicina dentária utilizá-los como forma de aprendizagem autónoma, pelo que é necessário saber como é gerida esta plataforma e a credibilidade do que contém. **Objetivo:** Avaliar como a plataforma Youtube® tem sido utilizada por estudantes de Odontologia em sua formação. **Métodos:** Foi realizada uma scoping review com as diretrizes PRISMA-ScR para explicar as questões de pesquisa: Como a plataforma YouTube® tem sido utilizada por estudantes de odontologia? Com que frequência é usado em comparação com outras redes sociais? Os alunos acreditam que os vídeos possuem comprovação científica? Os critérios de inclusão são especificados como população (estudantes de odontologia), conceito (uso do YouTube®), contexto (educação odontológica) e tipos de fontes de evidências (publicação revisada por pares). **Resultados:** Foram identificados 239 estudos, dos quais doze publicados entre 2005 e 2022 foram incluídos, a maioria com delineamento transversal. O YouTube® é uma das redes sociais mais utilizadas e é utilizado principalmente por estudantes de odontologia para observação de procedimentos clínicos. Há uma falta de confiança no nível de evidência encontrado na plataforma. **Conclusão:** O YouTube® é utilizado na educação odontológica para facilitar o aprendizado, principalmente em procedimentos clínicos. Há uma desconfiança no nível de evidência que os vídeos contêm, por isso é recomendável analisar a qualidade do material e que as instituições de ensino aumentem o desenvolvimento dos vídeos. **Palavras-chave:** educação odontológica; odontologia; estudantes de odontologia; Internet; mídia social; rede social; YouTube

## INTRODUCTION

Dental education has changed in recent years. Technology has gained space in education due to its multiple advantages, ease of access, approval by new generations and the creation of new opportunities to apply pedagogical and didactic strategies. Consequently, the teacher has transformed his pedagogical work methodology (1), so that social networks and educational platforms allow the creation and exchange of virtual content. With demand and supply, various platforms and applications have been created, so their complexity has decreased over the years (2). On the other hand, involved and applied students seek constant learning to ensure that in the future they are capable of acting effectively in their work activities (3). The new educational platforms are shown as indispensable tools to improve the conditions that traditional education provides to students and thus expand access to information and the acquisition of knowledge (4). Recently, it has been shown that social networks promote student learning, since they were motivated by the content of social networks, there were positive behavioral changes and they added fundamental knowledge for the comprehensive care of the population (5).

Dental education shows high hands-on learning and teaching of clinical procedures, so teachers find it challenging to use different tools for learning. Teaching individually becomes complicated with the number of students in the classroom, so the use of videos as teaching tools allows a greater scope of vision and understanding by students. A study that compared learning between written clinical cases and video clinical cases concluded that video cases significantly improved cognitive learning outcomes (by facilitating good discussions, identifying public health problems, among others), in the affective aspect (empathizing with patients and learning about inequality in social sectors) and learning in general (6). In another study, students highlighted the value of video learning for improving communication skills and professional behavior (7). A systematic review showed that learning from videos was comfortable, novel, easily accessible, and highly functional, since it allowed mental preparation of clinical skills before patient care (8). Given this, the videos are manifested as an educational tool.

Educational media showing free access are commonly used by dental students. Since the appearance of the first YouTube® video in 2005 (9), this platform has shown popularity among dental students (10,11). Likewise, it is widely used to visualize dental clinical procedures (12). As it is an open platform, any user can create content that will be viewed by millions of people, which is why dentistry professors are concerned about whether the content that students see on this platform and on social networks has scientific evidence (5,13,14). On the one hand, it is argued that social networks can benefit student

learning, by accepting that it is used as a tool in dental education. On the other hand, it is argued that the potential problems and risks in the use of social networks and educational platforms outweigh any benefits found in learning, so it should not be used as a tool in dental education (5). Studies have been reported that show YouTube® as a teaching tool, however, there is no scope review that shows the panorama of the use of this platform by dental students. Therefore, the following research questions arise: How has the YouTube® platform been used by dental students? How often is it used compared to other social networks? And what level of scientific evidence does YouTube® provide to students?

Therefore, the following scoping review is shown, with the aim of evaluating how the YouTube® platform has been used by dental students in their education, analyzing its use, frequency and level of evidence. The key elements of the research questions to conceptualize the focus of the review were: dental students, as a population; use of the YouTube® platform, as a concept and dental education, as a context. Peer-reviewed publications were used as a source of evidence.

## **MATERIALS AND METHODS**

### **Protocol and Registration**

This review was conducted in accordance with the Guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-analysis extension for scoping reviews (PRISMA-ScR) (15,16), in accordance with the Joanna Briggs Institute Reviewer's Manual (17).

### **Identification of the Research Question**

The proposed research questions were: How has the YouTube® platform been used by dental students? How often is it used compared to other social networks? And what level of scientific evidence does YouTube® provide to students?

### **Eligibility Criteria**

All studies that met the following inclusion criteria were included: (A) peer-reviewed publications; (B) the purpose was related to the use of YouTube by dental students; (C) be written in English, Portuguese, or Spanish; and (D) being published between 2005 (the year the YouTube® platform started) and 2022. Publications with secondary data (book chapters, reviews, among others) and letters to the editor were excluded. Eligibility criteria are in line with the Joanna Briggs Institute Reviewer's Manual (17), since the inclusion criteria are specified as: population, dental students; concept, to the use of the platform; context, to dental education and types of evidence sources, to the peer-reviewed publication.

### **Search Strategy and Information Sources**

Two trained investigators performed a systematic search of the PubMed, Google Scholar, MEDLINE, SciELO, LILACS, and BBO databases. The search strategy used the keywords: "Dentistry students", "Dental education", "social networks", "YouTube" and their synonyms, associated through descriptors and logical operators. Table 1 shows the search strategy used in each database. Final search results were exported and downloaded in ENW, RIS, or NBIB format. The files were then imported into the Endnote X8® program (Endnote, Philadelphia, USA) and duplicates were removed.

TABLE 1  
Search strategy and keywords used with each database \*

| Database                | Search Strategy and Keywords                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Result  |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>PubMed</b>           | (Dental Students[MeSH Terms]) OR (Student, Dental[MeSH Terms]) OR (Dental Student[MeSH Terms]) OR (undergraduate[Title/Abstract]) OR (dental student[Title/Abstract]) OR (dental students[Title/Abstract]) OR (pre postgraduate[Title/Abstract]) AND (((((Education, Dental, Continuing[MeSH Terms]) OR (Education, Dental, Graduate[MeSH Terms]) OR (Education, Dental[MeSH Terms]) OR (dental education[Title/Abstract]) OR (graduate dental education[Title/Abstract]) OR (continuing dental education[Title/Abstract]))) AND (((((((Media, Social[MeSH Terms]) OR (Social Medium[MeSH Terms]) OR (Social Media[MeSH Terms]) OR (social media[Title/Abstract]) OR (videos[Title/Abstract]) OR (open access videos[Title/Abstract]) OR (online videos[Title/Abstract]) OR (youtube[Title/Abstract]) OR (YouTube video[Title/Abstract]) OR (YouTube videos[Title/Abstract]) AND (2005:2022[pdat])))))))) | 100     |
| <b>Google Académico</b> | “dental students” AND “dental education” AND “social media” AND youtube                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 109     |
| <b>Medline</b>          | dental students AND dental education AND social media AND youtube                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 7       |
| <b>SciELO</b>           | (dental students) AND (dental education) AND (social media) AND (youtube)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 6       |
| <b>LILACS and BBO</b>   | (dental student) AND (dental education) AND (social media) AND ( db:("LILACS" OR "BBO") AND mj:("Estudantes de Odontologia" OR "Educação em Odontologia" OR "Rede Social" OR "Mídias Sociais" OR "Odontologia") AND la:("es" OR "pt" OR "en")) AND (year_cluster:[2005 TO 2022])                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 13<br>4 |

\* SciELO: Scientific Electronic Library Online. LILAC: Latin American and Caribbean Literature in Health Sciences. BBO: Brazilian Bibliography of Dentistry

## Selection of Sources of Evidence

Based on the inclusion and exclusion criteria, two reviewers independently assessed the titles, abstracts, and full texts of all publications identified in the search. If there was disagreement during study selection and data extraction, this was assessed a third time and jointly, where necessary. The intra- and inter-observer kappa coefficients were performed using 70 % of the previous studies identified. The selection of sources was fulfilled until July 30, 2022.

## Process of Graphical Representation of Data

Data from each study were condensed in tabular form. The variables were analyzed: name of the authors, year of publication, place of development of the research, objectives/question, study population/sample size (when applicable), methodology, type of intervention (when applicable), concept, the key results and findings that relate to the research questions.

## Summary of Results

After data tabulation, a narrative summary was performed. The results were presented and discussed according to the research questions.

## RESULTS

The intra-examiner kappa coefficient was 0.94 (CI 0.58 - 1.00) and the inter-examiner was 0.80 (CI 0.72 - 0.91). A PRISMA-ScR flowchart of study identification and selection is shown in Figure 1. From

the 6 databases, 239 studies were identified for selection. When downloading the data to the Endnote® program, 9 were excluded due to being duplicates, 200 studies excluded after analyzing the research title, and 18 excluded after analyzing the abstract. Therefore, 12 studies were included in the review. Table 2 shows a summary of the included studies.

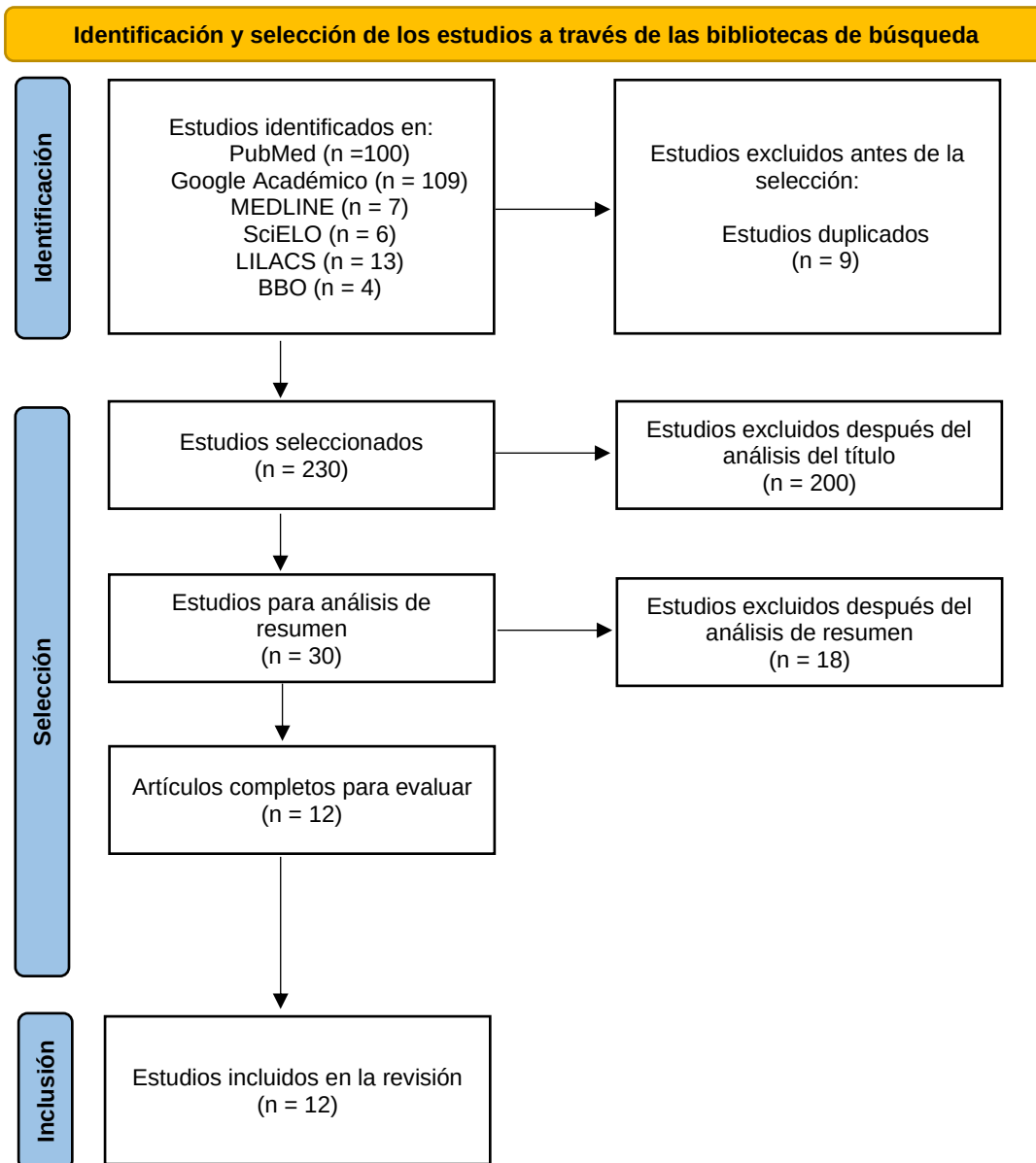


FIGURE 1  
PRISMA-ScR flow chart with details of the data search and selection process (16)

TABLE 2  
Summary of included studies

| Author and year           | Question/objective                                                                                                                                                            | Design Methodology          | Methodology                                                                                                                                                                                                                                                                                                                                        | Results of Interest and Conclusion                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aldallal et al. 2019 (18) | To assess the use and effectiveness of YouTube® as a learning resource for oral surgery by fourth and final year dental students at a single university.                      | Cross-sectional descriptive | They conducted a survey through a 16-question online questionnaire to investigate the perceptions of fourth and final year dental students about teaching in the oral surgery course and the use of YouTube® as a learning tool.                                                                                                                   | 122 students responded to the survey. 82.67% used YouTube to study surgical procedures. 33 students argued that the YouTube videos did not match the teaching at the university. 50 students responded that the videos had influenced their practice. In conclusion, teaching methods evolve over time. YouTube® could have a complementary role in oral surgery curricula but should not be used without validated instructional material.                                                                                           |
| Burns et al. 2020 (12)    | To evaluate the use of YouTube® as a learning tool for clinical procedures among third- and fourth-year dental students                                                       | Cross Multi-institutional   | A multiple-choice survey was administered to third- and fourth-year dental students at 5 dental schools in the United States. Questions were asked about the use of YouTube® related to: demographic information, general use, as a tool to learn clinical procedures, sharing and validity. Descriptive and quantitative analyzes were performed. | 479 students were surveyed. The primary use of YouTube® was for entertainment (74.3%), educational purposes (7.3%), and non-academic tutorials (8.1%). 95% of respondents found videos a useful learning tool, and 89% would like their faculty to post tutorials. 36% of students lack confidence in the evidence base of the videos. In conclusion, it is important to analyze the quality of the material that students access. It is suggested that institutions increase the development of evidence-based instructional videos. |
| Dias et al. 2019 (19)     | Evaluate the reliability of dental education content found on YouTube®. Determine whether users' interaction with the video is affected by the way the content was delivered. | Cross-sectional description | A YouTube search for dental procedure content was conducted using the keywords: "restorative dentistry", "pediatric dentistry", "orthodontics", and "oral surgery". The number of views, duration, category, retention rate and publication date were analyzed                                                                                     | Universities provided only 5% of the content on YouTube®. Older videos had more views per month ( $p < 0.05$ ) and a better engagement rate ( $p > 0.05$ ). Most users preferred long videos ( $p < 0.05$ ) and the engagement rate was better for older videos ( $p < 0.01$ ). Short videos had 70% user retention. In conclusion, most of the content did not meet the reliability criteria, so universities need to consider how their students use YouTube® and incorporate the findings into their curriculum.                   |
| Dias et al. 2019 (20)     | Evaluate the video content offered by dental schools in the UK and the Republic of Ireland on their YouTube® channels and public websites.                                    | Cross                       | They evaluated the free videos offered on UK and Republic of Ireland dental school websites and YouTube® channels viewed and configured according to their educational or non-educational purpose. The number of views, duration, category, and publication date were analyzed.                                                                    | 627 videos available on 83% of websites were evaluated. 9% was educational content. Most of the videos, provided by universities, were not educational and focused on promoting Dentistry courses. Most of the websites have shown a password protected area where you can offer quality content. In conclusion, there is limited availability of dental-related educational video content on dental                                                                                                                                  |



college websites or YouTube®. Institutions must take steps to produce more open access material.

|                                  |                                                                                                                                                                          |                             |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fu et al.<br>2021 (21)           | Examine perceived barriers to achieving clinical competency in endodontics and explain how YouTube® is used to supplement formal education in this discipline.           | Cross-sectional descriptive | Graduate students in endodontics interviewed fourth-year dental students at New York University School of Dentistry. Questions were asked about perceived barriers to clinical competency in endodontics, experiences using YouTube® to learn about clinical endodontics, and preferences for learning in video format. | 30 students were interviewed. 96.7% use YouTube® as a learning tool for dental procedures and 83.3% to learn about endodontics. Students primarily used YouTube® to build confidence and understand the flow of procedures. In conclusion, The use of YouTube® helps students overcome perceived educational and psychological barriers that have resulted in confidence and knowledge gaps in performing endodontic procedures. Students valued the easily accessible, limited-length video content where clinical procedures were performed on live patients. |
| Grillon y<br>Yeung,<br>2022 (22) | Evaluate YouTube® videos that demonstrated panoramic radiographs in terms of preparation and positioning procedures, and operator safety procedures.                     | Cross-sectional description | A systematic search for YouTube® videos on procedures in radiology was performed. 40 videos were included and analyzed regarding content characteristics and their activity on the platform.                                                                                                                            | In general, the videos correctly explained the procedures, preparation and positioning of the patient. However, most of the videos did not demonstrate operator safety details regarding the use of proper personal protective equipment. The channel's view, comment, and subscriber counts were positively correlated with the likes count. In conclusion, doctors and students should make judgments about the content of instructional videos and consult other sources to complement the knowledge.                                                        |
| Hamid y<br>Jaafar.<br>2021 (13)  | To examine social media application use among dental students and investigate significant demographic variables regarding the use of social media for academic purposes. | Descriptive Cross           | All dental students from Universidad Teknologi MARA were interviewed through Google Forms. The validated interview obtained results of demographic aspects, frequency of use of social networks and their opinion about social networks in education.                                                                   | 244 students were interviewed. 82.8% are subscribed to YouTube® and the platform is the fifth most visited social network. YouTube® provides more interactive videos and multimedia programs that are helpful in the learning process. In conclusion, social networks offer opportunities and challenges to explore different methods to assimilate social networks in the teaching and learning process to attract the interest of students.                                                                                                                   |
| Javed &<br>Bhati.<br>2015 (11)   | To explore the trend of use of social networks among postgraduate students and the usefulness of social networks in their academic performance.                          | Cross-sectional description | The study interviewed graduate students of Bachelor of Medicine, Bachelor of Surgery and Bachelor of Dental Surgery at Nishtar Medical College, Multan, Pakistan. A questionnaire on the use of social networks and a previous literature review were used.                                                             | The 162 respondents answered that the most used social network was YouTube®. Social networks are frequently used to obtain information. In conclusion, social networks play an effective role in academic performance and it is recommended that they be used to discuss topics related to health, patient care and treatment.                                                                                                                                                                                                                                  |

|                             |                                                                                                                                                               |                                 |                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Knösel et al. 2011 (10)     | Systematically assess the informational value, intent, source, and bias of dental-related videos available on the Internet video-sharing platform, YouTube®   | Cross-sectional description     | YouTube® was searched for dental-related videos using system-generated rankings ("by relevance" and "most viewed") and two categories (Everyone and Education). Each of the first thirty results was rated by two raters who completed a questionnaire.                                                                                                                      | The results revealed a wide variety of dental information available on YouTube®. The purpose of these videos includes entertainment, advertising, and education. Videos categorized under Education have a higher degree of usefulness and informational value than those found in a broader search category. YouTube® and similar social networking websites offer new educational possibilities for dentistry.                                                                                                                                                      |
| Seo et al. 2018 (23)        | Confirm the applicability of YouTube® as a video lecture platform for dental students and assess their learning attitudes towards the flipped classroom model | prospective cohort              | 69 second-year students from Dankook College of Dentistry, Korea were assessed on learning experiences after using YouTube platform prior to periodontics classroom for 2 semesters in 2016. The videos were uploaded by the instructor of the lectures to YouTube® before each class. At the end of the second semester, the students were surveyed through a questionnaire | De los 69 estudiantes, el 76.8 % siempre vio la conferencia antes de la clase, 69.6 % usó teléfonos inteligentes y 95.7 % afirmó que veía las conferencias en casa. 82.6 % respondieron que las conferencias en video eran más fáciles de entender que las conferencias presenciales (82.6 %) y que les gustaría volver a ver los videos después de graduarse (73.9 %). En conclusión, YouTube® es una plataforma adecuada que facilita el aprendizaje autodirigido de los estudiantes, al brindar formas de aprendizaje flexibles y diversas para un aula invertida. |
| Turkyilmaz et al. 2019 (24) | To evaluate the influence of e-learning in dental education according to the perception of dentistry doctoral students.                                       | Cross-sectional description     | A 14-question survey was conducted and distributed electronically to second-, third-, and fourth-year doctoral dental students at New York University. The survey was regarding the preferred electronic resources that students perceive have improved their academic performance.                                                                                          | 255 alumnos participaron en la encuesta. Las tres principales aplicaciones electrónicas de mayor impacto en su aprendizaje fueron: YouTube®, Bone Box y Google. El 70 % dedican de 1 - 4 horas por día a los recursos electrónicos para el rendimiento académico. El e-learning tuvo un efecto significativo en la comprensión didáctica y clínica. En conclusión, la alta preferencia de los estudiantes por YouTube® sugiere la utilización de esta modalidad para la entrega de material educativo.                                                                |
| Uma et al. 2021 (25)        | To explore and compare the current use of social media among dental college students from two countries: Malaysia and Finland.                                | Transversal Multi-institutional | A survey was conducted among dental students for the academic year 2020-2021 from two dental schools in Malaysia (Manipal Melaka College of Medicine and University of Malaya) and Finland (University of Helsinki and University of Oulu), evaluating the use of social networks and perceptions of the use of social networks in relation to dentistry.                    | WhatsApp, YouTube®, Instagram, Facebook and Snapchat were the most popular networks. The most used application was WhatsApp. Students in Malaysia spent more hours per week using the platforms as study tools than students in Finland. Malaysian students used the YouTube® platform more than Finnish students. In conclusion, the findings offer evidence that dental students extensively use social networks and the use between educational and personal reasons is related.                                                                                   |



Most of the studies were of a cross-sectional study design (11 studies), and one investigation was a prospective cohort. Seven studies evaluated only the YouTube® platform in dental education, three studies evaluated social media in general and dental education, and two studies evaluated YouTube® with other sites. Two studies were multi-institutional.

### **How has the YouTube platform been used by dental students?**

Studies show that YouTube® is used to study clinical procedures. Among the main uses we can mention entertainment, educational purposes and non-academic tutorials. Users are used to watching long videos, although short videos showed up to 70% retention. Older videos showed more interactions than new ones. Furthermore, in one of the studies, students mainly used YouTube® to improve confidence and understand the flow of clinical procedures in endodontics. Regarding their categories, YouTube® videos classified under Education have a higher degree of usefulness and informational value than those found in a broader search category.

### **How often is it used compared to other social networks?**

The YouTube® platform remained among the top 5 most used social media sites by dental students. It was listed as the most visited social network for educational purposes in a 2015 study and as one of the platforms with the greatest impact in e-learning. From the videos and channels included in the platform, it was possible to conclude in a study that the count of views, comments and subscribers of channels were positively correlated with the count of likes.

### **What level of scientific evidence does YouTube® provide to students?**

In one study, students argued that YouTube® videos were not consistent with what they learned in college. Likewise, 36 % of students do not have confidence regarding the evidence base of the videos. Another study recommended that universities should consider how their students use YouTube® and incorporate the findings into their curriculum. One problem raised by students was that most websites have demonstrated a password protected area where quality content may be offered. Another problem presented was that the videos of clinical procedures did not present details regarding the operator and equipment. On the other hand, five of the studies did not show dissatisfaction and evaluated it as a suitable platform that facilitates learning.

## **DISCUSSION**

There is literature available to researchers on the use of the YouTube® platform in dentistry. Although there is a diversity in the tools used, objectives, purposes and types of studies, these allowed us to evaluate how the platform has been used in dental education. Twelve studies were analyzed to answer the study's three research questions. The result shows that students use the YouTube® platform for entertainment, educational purposes, and non-academic tutorials. With respect to other social networks, the YouTube® platform is positioned among the most frequented by dental students. Finally, there is some mistrust about the content of the videos on the platform.

The implementation of digital technology, educational platforms and applications has caused teaching and learning activities between educators and students to be carried out essentially through the use of digital technology. With the emergence of the COVID-19 pandemic, education worldwide changed drastically (26). In addition, in recent years, e-learning has emerged as a tool to improve dental

education. To achieve its success, it is important to know the preferences of the students and the applications they use to incorporate them into the learning and with this improve the attendance and perception of the students (24). Social networks have become versatile tools that have an impact on communication, personal relationships and didactics. For dental educational institutions, an active presence in social networks is considered essential to improve traditional teaching methods (27). Teachers should educate students about the benefits of social media and help them recognize the associated dangers when using it, as well as avoid inappropriate use (28).

Dental education involves teaching the teacher's skills, both didactic and clinical, to students (26). Students observe the procedures that the instructors perform step by step, then perform the procedure on laboratory models, and then perform it on patients. As complementary studies to what is presented in class, students seek information that allows them to visualize or broaden their knowledge. Likewise, the teacher is obliged to look for teaching alternatives for the students and achieve a greater scope in learning (14). An example of this is the use of video in dental education, which has shown benefits in the areas of basic sciences and in clinical practices (6, 23). Dental students favor the use of videos and also express a preference for this type of online content over other traditional formats (28). The results of this study show that YouTube® is considered an effective tool, in which students and teachers are benefited in the context of learning and teaching, by facilitating the interactive exchange of information. Studies in other areas use YouTube® for entertainment, information search, and academic learning as the main reasons for use (29). The present study shows the same trend in the use of the platform, in addition to revealing that students improve their confidence and better understand clinical procedures (21).

The findings of this study support that YouTube® has educational videos, although there is uncertainty about the quality of the information. Self-learning is affected by videos that can be of poor quality, misleading and inconsistent content. According to Dias et al. (19) Only 5 % of the content on YouTube® is made by universities. A systematic review evaluated the reliability of content related to oral medicine on YouTube® and concluded that the platform represents a dynamic device that disseminates medical-scientific content, however, most of the information collected in the literature shows a lack of knowledge. appropriate. According to the European Commission, online disinformation can be combated by focusing on five pillars: increasing transparency, promoting media and information literacy, empowering users, safeguarding the media ecosystem, and investigating the impacts of disinformation (30). It is important that students are able to discern the validity of the information, as well as teachers teach and promote dentistry based on scientific evidence.

A useful tool for evaluating online content are the criteria created by the University of California Berkeley Library (31), which are: authority, purpose, publication and format, relevance, updating, and documentation. The content should allow the user to verify the author, affiliation and publications. Analyze the reason why the content is produced. The publication will be more reliable if it is peer-reviewed and produced by a recognized think tank. The importance of the content in the areas of study interest should be analyzed. Be guided by the time in which the content is produced, and not by the most recent publication. All videos should cite the sources of information to verify the quality of their references. If students take these criteria into account, they will find more scientific evidence in YouTube® videos.

With the use and importance of the YouTube® platform in dental education, the evaluation of scientific evidence used in the contents is important. Future contributions to the platform, individually or by educational institutions, should be focused on developing content in a systematic way so that users receive quality information and achieve dentistry based on scientific evidence. This study shows an overview of the YouTube® platform as an educational tool in dentistry. Future studies can be carried out in order to perform a quantitative analysis or to review the level of scientific evidence that the scientific publications on this topic. The study aims to motivate teachers to promote the use of the platform as an educational tool, as well as the creation of new content based on scientific evidence.

## CONCLUSIONS

YouTube® is shown as a platform that can be used for educational purposes, by facilitating the learning of clinical procedures, however, the level of scientific evidence must be analyzed.

## RECOMMENDATIONS

There is still distrust of the level of evidence that the videos contain, so it is recommended to analyze the quality of the material and that educational institutions increase the development of videos based on scientific certainty.

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