Who is providing dental education content via YouTube?

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Key points

Suggests the most popular dental education content, available on YouTube, does not match published reliability criteria.	Suggests the watching habits of dental students are influenced by the length of clip and when the video was released.	Highlights the importance of educating students on how to search for online video resources and to encourage universities to provide more open online content.

Abstract

Introduction Online video sharing platforms are regularly visited by dental students. However, they may be accessing non-peer-reviewed content which is not officially recommended by their dental school's curriculum.

Aims To evaluate the reliability of dental education content found on YouTube.

Methods A YouTube search for dental procedures content was conducted using the keywords 'restorative dentistry', 'paediatric dentistry', 'orthodontics' and 'oral surgery'. The first ten results of each search were set according to its publisher. The number of views, length, category, retention index and date of publication were analysed.

Results Around 70% of the videos were published under education/science categories. These 40 videos received 25 million visitors and showed an average length of 9.22 min (± 8.19). Universities provided only 5% of the content. Older videos had more views per month (p <0.05) and a better interaction index (p >0.05). Most users preferred the long videos (p <0.05) and the interaction index was better for those older videos (p <0.01). Short videos had 70% user retention, while ten-minute-long videos had 21%.

Conclusions Most of the content found did not match the reliability criteria. Universities should consider how their students use YouTube and look to incorporate their findings into their curriculum. Content length and more recent dental videos will influence student retention and learning.

Introduction

The growing online spread of fake news and online disinformation motivated the European Commission to set up a High-Level Expert Group (HLEG) to deal with this problem. The HLEG report[1] defined disinformation, more popularly known as 'fake news', as all forms of false, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or to create profit. The HLEG report was also used to warn against simplistic solutions such as censorship.[1]

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The HLEG established five pillars to sustain a multidimensional approach of combating this disinformation, based on: 1) enhanced transparency; 2) promotion of media and information literacy; 3) empowering users to tackle disinformation; 4) safeguarding the diversity and sustainability of the news media ecosystem; 5) promoting continued research on the impact of disinformation.[1]

How does this impact on dental education? Are dental courses prepared to deal with the consequences of students and professionals immersed in a web of disinformation? Dental students expect to access not only lectures but also other digital content at their convenience. The amount of content available online is infinitely larger than any other recognised source is able to provide, including universities, teachers, books and closed virtual learning environments.[2] However, much of the material that they are accessing online is not peer-reviewed.

Online content is attractive, as it can be found in different formats, and fits almost every person's needs and learning style, irrespective of its accuracy. Consequently, students will look to the internet to find additional educational content.[3,4] One of the preferred methods of accessing content is watching video on online sharing platforms. [4,5] There are multiple reasons why students use the YouTube platform and they include the following:

1. It is easier to follow and listen to someone than to read the same content
2. Online video sharing platforms are already seen as a leisure tool
3. Most people have access to the internet
4. It is possible to access the content whenever you want and wherever you are
5. Some universities do not provide sufficient online content for their students' needs
6. Most university-provided content is password protected and only available to students of that institution

7. You are not judged by others if you watch such video content. No identification is required and no 'records of your actions' are supplied to your course providers

8. The more you search, the more you find. Search engines such as Google offer customised results based on the user's activity history.

YouTube is the most popular video sharing online platform and the second most accessed page on the web. Google web searches will also direct users to YouTube content.[6] YouTube does not have any strict regulations and requires no formal identification. For these reasons, anyone, including experts, companies or laypeople, can publish content. The YouTube platform also allows the publisher to classify the content into different categories including education and science, with no pre-determined peer review.

On YouTube, we can find dental content from entertainment and advertising to education and science. Some professionals and laypersons described the videos classified under the education category as useful.[7] Nevertheless, a considerable amount of the videos classified as educational are not as reliable as expected for many reasons including provider bias.[8,9,10]

The literature concerning the use of video sharing platforms as a complementary learning tool in dentistry is limited. It was observed that 97.5% of the students learnt clinical procedures through the internet. Students usually obtain these videos by googling (77.7%) and/or by watching YouTube (93.2%). More importantly, students often share the content with their peers but only 13% discuss it with their teachers. This highlights a problem within dental education where dental students are accessing information which may not be reliable.[4]

Aims

1. Evaluate the reliability of dental education content found on YouTube
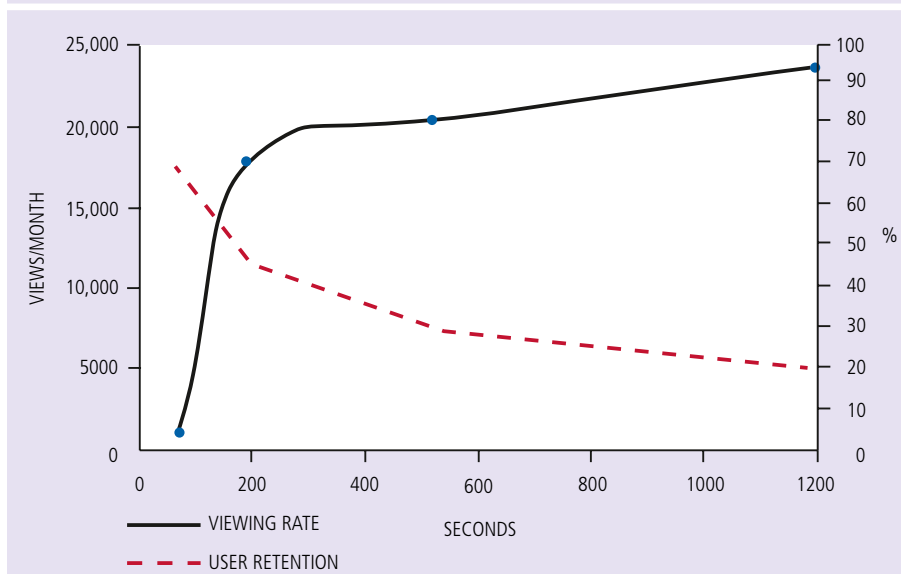2. Determine if users' engagement with video is affected by how the content was offered.

Methodology

In the last week of January 2018, YouTube was searched for videos related to dental procedures. Four English terms were used: 'restorative dentistry', 'paediatric dentistry', 'orthodontics' and 'oral surgery'. Robot learning was prevented by searching unlogged, using an incognito window, a cache clean browser, under default settings for sorting by relevance.

The publisher of the videos was identified and classified according to its authorship source as either individual, company, or academic. Data concerning the runtime, upload date, the provider of the content, and the category under which the video was uploaded, number of views and URL were documented. The quality was not evaluated.

Users' interactions with videos were evaluated based on the interaction index and viewing rate.[11]

Interaction index = (number of likes – number of dislikes)/total number of views

Viewing rate = total number of views/ number of months since upload.

Data were divided into groups and submitted for one-way ANOVA and Tukey test when necessary (BioEstat 5.3). The data was evaluated by selecting the ten:
1. Longest and shortest videos
2. Newest and oldest videos
3. Best and worst graded videos
4. Most and least watched videos.

The correlations among users' interactions, interaction index, length and update were tested by using the first and last ten results of each video characteristic. Data for video user retention was collected and placed in four groups according to the video length time, as follows: 0–2 min, 2–5 min, 5–10 min, and more than ten minutes. This was compared to video average viewing rate and video length. Video reliability was evaluated according to its publisher, educational purposes, peer-review system, relevance to the field, date of publication, and bibliographic references. Results

Within the methodology established for the present study, two out of 40 videos were offered by an American dental school. These two videos were outdated, having been made in the 1970s. The 40 videos evaluated were published in six different categories: education (18), science (9), people/blogs (8), comedy (2), film/animation (1), how-to/style (1), and sports (1).

Table 1 The influence of video length over user retention, viewing rate and interaction index (A=less than 2 min; B=between 2 and 5 min; C=between 5 and 10min; D=more than 10 min)

	A	B	C	D	
Length	71.8	189.4	522.8	1,187.8	Average time (s)
User retention	69.5	43.5	28.3	21.3	Average % of retention
View rate	1,008	17,833	20,476	23,543	Average views per month
Interaction index	0.9	3.0	8.5	19.6	Likes – dislikes/total number of views

Fig. 1 Demonstrating the inverse relation between the average viewing rate and user retention over video length.

The average video length was 9.22 (± 8.19) min. The videos received 25 million views, 21,593 (± 46,934) per month. The average duration on YouTube was 48 (± 28) months. It was found that 75% of the content was posted by individuals not connected to any university, 20% was made by companies, and 5% by one single American university.

The 40 videos were organised according to the category in which they were published and submitted for statistical analysis. In the first test, the videos published as educational were compared to the others. In the second test, the education and science and technology categories were combined and compared to the others. The only difference observed was that videos published as educational (p <0.05) or educational/scientific (p <0.01) are older than the others.

The findings revealed the following:

1. The movies with the highest interaction indexes were 76% older than the movies with the lowest interaction indexes (p <0.05)
2. The number of views in longer movies was 442% higher than the shorter movies (p <0.05)
3. The oldest movies presented an interaction index 264% higher than the most recent movies (p <0.01).

The last information evaluated was user retention. Only 55% of the videos found in this study had user retention information available. The user retention index decreased with the increase of video length (Table 1). The user retention information rate was combined with video length and viewing rate. It was possible to observe that the average video user retention is inversely related to viewing rate through time (Fig. 1); user retention presented a positive correlation to shorter videos.

Discussion

Free online medical information is unreliable. Recent research has shown that most online medical information is outdated, inaccurate, and potentially harmful.[12] Corroborating these observations within this research, it was found that universities provided only 5% of the dental educational content found online. The relation of factors such as source, category of publication, or time since the upload as well as their impact on the user's retention has not been evaluated in depth. The category in which the content is published does not affect a YouTube video viewing rate, nor the user's interaction or its number of views. It is known that students will use video content without checking the source closely.[3] So, the lack of influence of the category of publication on video viewing rate may be related to superficial and non-scientific styles of web search.

The European Commission established a multidimensional approach for combating online disinformation focused on five pillars: enhanced transparency, promote media and information literacy, empowering users, safeguarding the news media ecosystem, and research on disinformation impacts.[1] The problem is that most users are often poor at discerning the validity of the information or are attracted by simple marketing approaches, which are not genuinely based on any scientific principles. Moreover, the majority of internet users click on the top three results of any web search engine.[13] Interestingly in this research, it was demonstrated that video length is related to the number of views. It appears that users prefer the longer videos (p <0.05), although there is no evidence that such videos are more reliable.

The University of California Berkeley library has provided criteria that prove useful when evaluating online content. Authority: the content must allow the user to check the author, his affiliation, and previous publications. Purpose: concerns about the reason why the content was produced. Publication and format: was the content peer-reviewed in a similar manner to a scientific paper or produced by a recognised centre of studies? Relevance: deals with the importance of the content in the area. Update: when the content was produced, not when it was published. Documentation: relates to the sources cited and the quality of references.[14] None of the videos in this study adhered to all these principles.

Despite its reliability, not all users will watch the entire video content. The average time a video is watched is called user retention. The YouTube analytics tool shows user retention in percentages and considers the average time users watch a video in a determined period. User retention can be shown as one of the video statistics online. However, only 55% of the videos found in this study presented user retention information. It was observed that user retention decreased with time. Increasing the length of a video to eight minutes may cause a 50% drop in the retention index. This is interesting, as viewer preference is to select longer videos. Our results are similar to those described after the evaluation of more than 500,000 videos played more than 1.3 billion times presented by the Wistia agency on their webpage.[15]

Watch time is one of the focuses of YouTube algorithms.[16] Therefore, user retention information is now seen as a commercially useful statistic and is, therefore, more likely to be omitted. Video length plays an important role in the user viewing process. The longer the video, then the higher its viewing rate will be and interaction indexes, but its user retention index will be lower (Fig. 1, Table 1).

Increasing YouTube watch time (user retention and engagement) influences the manner of the content that is being published. Short movies showed better user retention levels (Fig. 1). Our research shows a trend of publishing shorter dental education movies on YouTube; although old videos presented a higher interaction index (p >0.01). The higher interaction indexes observed are probably related to how online search engines work. Nowadays, search engines use web crawlers (bots) to provide shortcuts for the most likely 'useful information'.[17]

More research is needed to understand why a user may like a partially watched video. YouTube's search algorithms rank the content by evaluating the users' engagement. Therefore, more user retention, more views and more likes or dislikes is still engagement and will lead to higher chances of the video being suggested for viewers watching similar content. Furthermore, this has implications for the type of dental content that is published. Most online content is being produced by non-academic publishers and no peer-review information is given on dental educational online videos. Teachers need to be aware that students are using online content to learn clinical procedures. However, less than 13% discuss the content accessed with their teachers.[4]

The 40 videos evaluated in this research were deemed unreliable; however, in spite of this, they received 25 million views which reinforces the finding that users have a low ability to find trustworthy information.[18] Convenience is often the main reason for selecting online content.[19] The challenge is how to empower or advise students on what makes a good quality video for learning purposes. A method of combating this is to increase the amount of high-quality content available online which in turn will improve the online learning experience.

The viewing numbers show that there is a huge demand for instructional videos and more research is needed on how they are used

and what educational impact they have on the students' learning experience. The majority of these videos on YouTube are not providing the correct information as there is a lack of peer review. However, this does not prevent them from being popular among students. Although teachers may consider them harmful, they may prove to be of benefit to many students, which may open a new avenue of research into the use of online video material.

Conclusion

Most of the content found did not match published reliability criteria. Universities should consider how their students use YouTube and look to incorporate such findings in their learning and teaching. Content length and more recently published dental videos may influence student retention and learning. Dental education providers should provide advice on searching for online content or provide more open source content, which is up to date and peer-reviewed.

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