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Who is providing dental education content via YouTube?

Background: 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: 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" or "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 movies had more views/month ($p < 0.05$) and a better interaction index ($p > 0.05$). Most users preferred the long videos ($p < 0.05$). The interaction index was better for the older movies ($p < 0.01$). Short videos had 70% user retention, while 10 min 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.

Keywords: Internet, dental procedures, blended learning, self-learning.

Key points

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

Introduction

The growing online spread of fake news and online disinformation motivated the European Commission to set up a high-level group of experts (HLEG) to deal with this problem. The HLEG report¹ defined disinformation (popular name “fake news”) to include all forms of false, inaccurate, or misleading information designed, presented and promoted to intentionally cause public harm or for profit. The HLEG report was also used to warn against simplistic solutions such as censorship.¹ HLEG established five pillars to sustain a multi-dimensional 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 and 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. However, the amount of content online is infinitely larger than any other recognised source is able to provide, including universities, teachers, books and closed virtual learning environments.² Much of the material that they are accessing 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 styles irrespective of its accuracy. Consequently, students will look to the internet to find additional educational content.^{3,4}

One of the preferred forms of accessing content is watching video on online sharing platforms.^{4,5} There are multiple reasons why students use the YouTube platform and include the following:

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

- 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
- The more you search, the more you find (search engines such as Google offer customized 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. YouTube 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 their 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

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

Methodology

On 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” or “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 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 ANOVA One Way and Tukey test when necessary (BioEstat 5.3®). The data was evaluated by selecting the ten:

- longest and shortest videos
- newest and oldest videos
- best graded and worst graded videos
- most watched and less watched videos

The correlations among users' interactions, Interaction index, length and update were tested by using the first and the 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 10 min. 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, updating, 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, being 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).

The average video length was 9.22 (\pm 8.19) min. The videos received 25 million views, 21,593 (\pm 46,934) per month. The average duration on YouTube was 48 (\pm 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 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 the video length (Table 1). The user retention information was combined to video length and viewing rate. It was possible to observe that the average video user retention is inversely related to viewing rate through time (Figure 1); user retention presented a positive correlation to shorter videos.

Discussion

Free online medical information is unreliable. Recent research has shown that most medical online 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, the category of publication, or time since the upload in dental education 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 multi-dimensional 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 will 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 & format*: was the content peer-reviewed; in a similar manner than 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*: is related to the cited sources and 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. 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 large 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 will be its viewing rate and interaction indexes, but its user retention index will be lower (Figure 1, Table 1).

Increasing YouTube watch time (user retention and engagement) influences the manner that the content is being published. Short movies showed better user retention levels (Figure 1). Our research shows a trend on publishing shorter dental education movies on YouTube. Although, old movies 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, it 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, only less than 13% discuss the content accessed with their teachers.⁴

The 40 videos evaluated in this research were poorly reliable; in spite of this, they received 25 million views which reinforce the finding that users have a low ability to find trustful 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 in 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.

Declaration of interests

The authors confirm that there are no known conflicts of interest associated with this publication.

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