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Uncovering dental student's online learning habits from an educator's perspective

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Abstract: Introduction: Dental students use of online material to supplement their learning has been studied but it is unclear whether educators are aware of the findings of this research. This study aimed to investigate dental students use of online content as a learning tool from an educator's perspective. Methods: Educators in the Dublin Dental University Hospital were invited to complete an online survey based on dental students' use of online learning. Quantitative descriptive statistical analyses were carried out as appropriate on the data collected. A focus group with interested survey participants was held to gain a deeper insight into educator's opinions on this topic. The transcript from this discussion was analyzed by deductive and inductive coding methods. Results: From a sample of 20 educators, this study found that educators were not aware that students rely on Google and YouTube for educational videos more than university websites. Most educators believed that students are likely to refer to online videos to prepare for dental procedures that they have not done before. The same amount also believed that teachers should incorporate videos into their learning. Howev-er, 30% of educators have not uploaded or recommended online videos to their students. Most educators believed they have discussed accuracy and/or relevancy of online content with their students. Interestingly, only 20% believed that students would discuss a contradictory video with their lecturers. The focus group participants expressed concern over the accuracy of online content. They felt that this along with a lack of time were the main reasons that deter them from referring students to online videos. Conclusions: Dental educators are unaware that students access online dental content through Google and YouTube more often than through official academic platforms. Educators are concerned about the accura-cy of online dental content. Many believe that they direct their students on how to determine the accuracy of online content which contrasts with other researchers' findings. More communication is needed be-tween educators and dental students to address each other's concerns and enhance student's learning.

Keywords: ·dental education; dental curriculum; E-learning;·video learning

1. Introduction

Online learning has become increasingly popular in recent years. With the COVID-19 pandemic disrupting traditional in person teaching methods, the need for effective online education has become more vital. Research suggests that online learning may be used successfully in a dental school's curriculum to enhance students learning, particularly in the clinical curriculum [1]. While students perceive it to improve their performance there is currently a lack of evidence which proves that online learning directly enhances performance in exams [1]. Further research is needed to fully understand the impact of online learning on students' academic performance [1].

The current generation of dental students are different types of learners than their predecessors. Having grown up surrounded by modern technology, it is not surprising that these students frequently turn to platforms like YouTube for educational support [2]. Students are in favor of online

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learning due to the flexibility and accessibility that it provides [3,4]. In fact, many students even find video tutorials easier to understand than traditional face to face lectures [5]. The format of dental education is evolving, and educators must adapt their teaching styles to meet the learning needs of their students' [6]. Failure to do so may be detrimental to students' learning.

Educators may be hesitant to shift their teaching style to online learning due to a perceived lack of benefit, the difficulty in developing online resources, the frequency of student usage, and the time investment required [7–10]. A study by da Silva *et al*. [11] revealed UK and ROI dental schools provide limited online educational content. Moreover, the majority of available videos in these schools are non-educational and focus more on promoting the dental course [11].

Dr Mike Ryan from the World Health Organization alluded to the problem of health misinformation stating, "We need a vaccine against misinformation."[12]. The 'infodemic' [13] also impacts dental education unfortunately. Much of online dental content may not even be produced by licensed dentists or dental educators [14]. Dias da Silva *et al*. [15] noted that many dental students use online sources that contradicts what they have been taught by their lecturers. It is crucial to determine if educators are aware of this behaviour.

Previous investigations into dental students' behaviour around accessing online content have mainly focused on the topic from a students' perspective but failed to provide enough insight from an educator's perspective. Therefore, it is important to gain an understanding from an educator's perspective before deciding whether or not to utilise online learning more frequently in dental education.

The findings from da Silva *et al.*'s [13] and Burns *et al.'s* [2] research informed our study design, which aimed to explore educator's perspectives on students' behaviour when accessing dental content online. We adapted the questions asked in these two studies and posed them to educators so that we could compare students' perception of online learning with educator's perceptions. We utilized an anonymous web-based survey to gather information from a sample of DDUH educators, followed by a focus group for interested participants to further clarify their opinions on the topic. The goal of the study was to determine if a disconnect exists between students' and educators' perceptions of online learning.

2. Materials and Methods

Ethics approval was granted by the School of Dental Science Ethics Committee at the Dublin Dental University Hospital (DDUH) on 21st November 2022, approval code: DSREC2022-10.

To recruit participants, a mass email via a gatekeeper was sent to all email addresses in the DDUH staff directory. The e-mail included an information leaflet which explained the objective of the research project. Questions for the survey were reflective of previous research by Burns *et al.* [2] and da Silva *et al.* [15] and also, those which we needed information on locally.

We began collecting survey data on 1st December 2022 and finished collecting data on 17th January 2023. We collected our data by sending out an anonymous link to our Qualtrics-housed survey. Each participant gave their consent and had the freedom to opt out of the survey at any point with their submitted responses being deleted immediately. Data was stored on the Qualtrics application and then downloaded for use in Microsoft Excel and SPSS. Using Qualtrics, the data was tabulated which integrated the submitted responses. Further analyses were completed in SPSS and Excel. Chi-square tests and Fisher Exact tests were carried out as appropriate for measuring relationships between responses.

Two authors conducted the focus group: both are undergraduate dental students who completed a qualitative data analysis course offered by the developer of the Delve qualitative data analysis software [16]. The participants were recruited from lecturers and teaching staff who participated in the original convenience survey and thus had established learner-educator relationships. Participants knew they were engaging as part of a student research project.

In the original email sent out, participants were invited to participate in the focus group. Those interested were asked to email the gatekeeper. A total of four educators took part in the focus group. Two educators that expressed interest in participating dropped out a later stage. The focus group

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took place in a seminar room in the DDUH. Only the focus group participants and two authors were present.

We developed questions for the focus group which we believed would prompt discussion amongst participants. These questions were not pilot tested but rather based on our survey findings. A single session was scheduled and held for an hour. One author acted as the moderator, ensuring all participants were given an equal chance to raise their opinions. The second author acted as the note taker, responsible for time management and prompting the moderator to move on so that all questions were asked. Additional or repeat interviews, transcript return, and feeding back to participants did not take place, nor was data saturation discussed owing to the limited availability of educators and timeline for the project. Field notes were made after the focus group.

The data (focus group discussion) was collected using a digital audio recording device (Zoom H1N). This audio file was transferred to a secure data server which was password encrypted and then deleted off the audio device immediately. This recording was then transcribed to text using Microsoft Word. Eight authors coded the data. Themes used for coding were decided based upon recurring points which were stated by the focus group participants. Both deductive and inductive coding analysis was aided using the Delve Qualitative Data Analysis Tool [16].

Participants did not provide feedback on the findings. Participant quotations were presented under a specific theme to illustrate the findings. Each quotation was identified by the participant number.

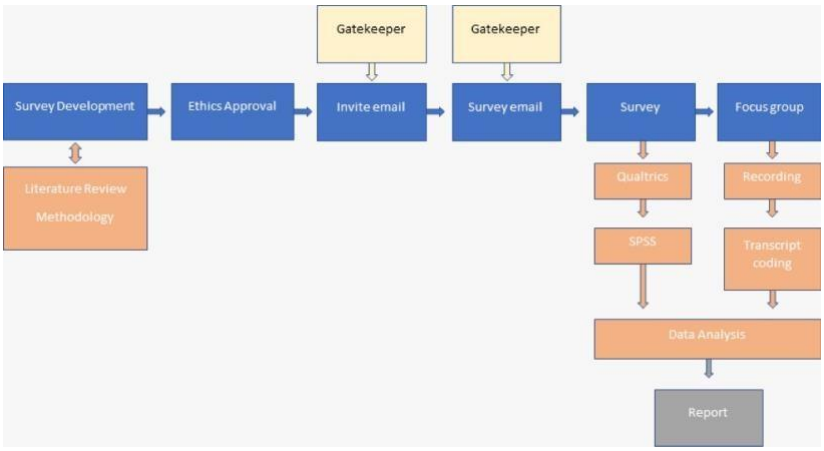

Figure 1. Methods and Materials flowchart.

3. Results

Fully completed survey data was collected from 20 of 60 teaching staff invited to participate, for a response rate of 33%. Of these educators, most (n=8, 40%) were from the 50-59 age years old age group. The majority of educators (n=12, 60%) have been teaching for at least 10 years (Table 1). The majority of educators (n=11, 55%) selected discussion groups as their preferred teaching method.

Table 1. Survey participant demographics.

		n	%
Age	Less than 50 years of age	10	50
	50 years of age or older	10	50
Years teaching	Less than 10 years	8	40
	10 years or more	12	60
Preferred teaching method	PowerPoint lectures	5	25
	Discussion groups	11	55
	Video tutorials	1	5
	Books	1	5
	Other	2	10
		n	%

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	Other	2	10

3.1. Educators' preferences

According to the survey results, the primary teaching method of the majority of educators (n=9, 45%) was small group learning. In terms of the educators' preferred method of teaching dental students, the majority (n=11, 55%) stated that they preferred discussion groups. Video tutorials and books were not as popular. Only a small percentage (n=1, 5%) of educators reported that they preferred video tutorials as a teaching method. Additionally, one educator mentioned that their preferred teaching method varied depending on the year group they were teaching. For example, students in lower year groups may benefit more from books and lectures, whereas students in older clinical years may benefit more from discussion group learn-ing.

3.2. Student's actions from educator's point of view

The vast majority of educators (n=37, 74%) believed that dental students are obtaining information on den-tal procedures from online sources. More than half of educators (n=11, 55%) believed that students use internet search engines as their primary source to identify dental education videos. It appears that educa-tors consider YouTube to be a popular source of online video content for dental students. Some 36% of educators believed that dental students access dental procedure videos from YouTube. Most educators (n=13, 65%) believed that students typically favor the laptop or desktop computer to access dental education online.

Table 2. Survey Responses.

Question	n	%
Which is students preferred device for accessing dental education online?		
Smartphone	5	25
Tablet or iPad	2	10
Laptop or desktop computer	13	65
From which primary source do students' learn about dental education?		
Recommendations from teaching staff	4	20
Recommendations from classmates	5	25
Internet search engines	11	55
How frequently do students use online content as a complementary learning tool for dental course studies?		
Once a week	2	10
Always	15	75
Other	3	15
Students access dental procedure videos from … (select all that apply)		
YouTube	18	36
My university's website or virtual learning environment	11	22
Other dental school websites	8	16
Their classmates and friends	12	24
Other	1	2

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What would students do if they watched an online dental procedure which contradicts what you or your colleagues in the school have taught?		
Nothing	4	20
Ignore the resource	1	5
Show to you or your colleagues	4	20
Discuss with a classmate	11	55
What is the likelihood that students will refer to online videos to prepare for a dental procedure that they have never done before?		
Unlikely	0	0
Very unlikely	1	5
Likely	14	70
Very likely	5	25
If you have uploaded or referred students to an online video, what proportion of your students will actually watch that video?		
I have not uploaded and/or referred to an online video	6	30
0-20%	1	5
21-40%	6	30
41-60%	5	25
61-80%	2	10
Which of the following best describes your primary teaching activities?		
Formal lectures	5	25
Clinics	6	30
Small group teaching	9	45
What is your preferred method of teaching your dental students?		
PowerPoint lectures	5	25
Discussion groups	11	55
Video tutorials	1	5
Books	1	5
Other	2	10
It is challenging for me to incorporate online videos into my teaching activities		
Disagree	6	30
Somewhat disagree	1	5
Somewhat agree	9	45
Agree	4	20
Teachers should incorporate online videos when teaching clinical procedures		
Disagree	0	0
Somewhat disagree	1	5
Somewhat Agree	7	35
Agree	12	60
Students should only access online videos their teachers have recommended		
Disagree	4	20
Somewhat disagree	6	30
Somewhat agree	8	40
Agree	2	10
I upload videos I make to a video streaming platform or virtual learning environment to assist students with learning dental procedures		
I do not teach dental procedures	7	35
Never	4	20
Infrequently	7	35
Frequently	1	5
Always	1	5
I refer students to online videos to assist them with learning dental procedures		

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I do not teach dental procedures	6	30
Never	3	15
Infrequently	5	25
Frequently	5	25
Always	1	5
I have discussed the accuracy and/or relevancy of online video content with my students		
Disagree	6	30
Somewhat disagree	1	5
Somewhat agree	8	40
Agree	5	25

According to the majority of educators (n=19, 95%), students are likely to refer to online videos to prepare for dental procedures that they have never done before. All educators believed that students access online content to some frequency to supplement their learning. In fact, most educators (n=15,75%) indicated that students always use online content as a complementary learning tool.

According to the survey results, only a small proportion of educators (n=2, 14.3%) who have shared or recommended online videos to their students believe that a significant majority of them (60-80%) will actually watch the video. In fact, most of the educators in the sample (n=6, 42.9%) indicated that only a range of 21-40% of their students would watch a video that was uploaded or shared through a provided link. This perceived lack of engagement from the students is likely to be a contributing factor for why many educators refrain from uploading or sharing videos (n=6, 30%).

Interestingly, no general consensus was observed when educators were asked if students should only access online videos that teachers have recommended. Half of the educators (n=10, 50%) believed that students should only access online videos that their teachers have referred them to, while the other half (n=10, 50%) disagreed.

The majority of educators (n=11, 55%) believed that students would discuss with a classmate about a video which contradicts what they have taught them. Only 20% believed that students would discuss a contradictory video with their lecturers, however.

3.3. Educator's actions

The majority of educators who teach dental procedures (n=14, N=20) refer students to online videos to assist them with learning dental procedures (n=11, 78.6%). Of this cohort, 35.7% (n=5) have done this 'infrequently' while an additional 35.7% (n=5) have done this 'frequently'. Similarly, most educators who teach dental procedures responded that they 'infrequently' upload videos they make to a video streaming platform or virtual learning environment (n=7, 53.8%).

An overwhelming majority (n=19, 95%) of educators believed that teachers should incorporate videos into their teaching. Despite this, some 30% (n=6, 30%) of educators have not uploaded and/or referred their students to an online video. Some light is shed on this when we look at educators' response to the question whether it is difficult for them to incorporate videos in their teaching style. More than half of educators (n=13, 65%) find it difficult to incorporate videos into their teaching responding with 'somewhat agree' and 'agree' to the question 'whether it is challenging to incorporate video into my teaching'.

More than half of educators (n=13, 65%) believe they have discussed accuracy and/or relevancy of online video content with their students.

3.4. Focus group findings

3.4.1. Accuracy

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Further to the general findings of the survey questions grouped by 'students' action from educators' point of view', the focus group expressed concern over the accuracy of online content. One focus group participant said that "a lot of students question the accuracy of content and that they also do not discuss this with their teachers". This sentiment was shared by other participants, with one participant expressing doubt about students' ability to "critically appraise and judge content". These sentiments resembled findings from our survey questions.

Notably, one focus group participant highlighted that the viewers perception of online content may be biased based on the video's publisher. This participant believed that there is some conscious bias that "this video must be good" when a reputable institution like "Harvard" is involved. However, this is not always the case. Students need to be aware of this and should not assume that a video is credible simply because of its publisher.

3.4.2. Time

To add depth to the survey questions grouped by 'educators actions', the participants in the focus group added that the lack of time is one of the reasons why they do not refer their students to online videos. A quote from one of the participants that summarises this idea was: "There's a lot of good content out there, but it is very time consuming to find some specifics that you need". Another participant echoed this sentiment saying, "to do it properly is very time intensive".

3.4.3. Different Learning Styles

Another important point that was brought to attention in the focus group is the fact that learning styles differ depending on the student. One participant expressed "I think it's important to be aware of the type of learners you're dealing with". Another participant echoed this saying "So I think it's, it's good to understand as well what way other, students with their Western or Asian background use to learn". This viewpoint was also alluded to in the survey, with one educator stating that their preferred teaching method was dependent on the students learning style. The participant emphasized that the selection of a suitable teaching method should be a dynamic process that prioritizes students' learning.

4. Discussion

This study explored the behaviour of dental students around online content use from an educator's perspective. The responses to questions grouped by 'educators preferences' can be compared to a previous study by Turkyilmaz *et al.* [1] that asked students directly about their learning practices. According to the current survey results, most educators reported using small group learning as their primary teaching method. However, Turkyilmaz *et al.'s* [1] study found that the majority of students actually preferred a combination of traditional lectures and online learning. This suggests a disconnect between students' preferences and the teaching practices that educators are actually employing.

The responses to questions grouped by 'students actions from educators point of view' can be compared to the research conducted by Dias da Silva *et al.* [15] who asked students directly about their practices. For these questions, our findings from the teaching staff point of view show that educators have a good awareness of some of the actions that students take. Specifically, the vast majority of educators believe that students use YouTube to learn dental procedures. This is consistent with da Silva *et al.'s* [15] finding that the majority of students also use it for learning dental clinical procedures, albeit to a lesser extent from the educators' assumptions. Moreover, a different study by Burns *et al*. [2] revealed that students continue to prefer YouTube as a platform for learning over institutional, internal, or online platforms even when provided with video content. Our survey findings align with this trend from the educator's perspective.

The survey results demonstrate that educators believe students use online videos to supplement their learning, with most educators reporting that students always use them for this purpose.

Similarly, in da Silva *et al.'s* study, [15] the vast majority of students reported using online content as a complementary learning tool for their dental course.

However, there were some areas where educators seemed to be less aware of student behaviour. For example, educators did not appear to know that online content is accessed more often through Google and YouTube than through university websites, dental literature databases, and other search engines. According to our study most educators believed that students access dental videos from YouTube and university websites. However, da Silva *et al.'s* [15] study identified Google to be the most popular online resource used by students. It also appears that educators underestimate the extent to which students discuss contradictory videos with them. While da Silva *et al.'s* [15] study found that many students would discuss a contradictory video with their lecturer, the survey results show that only a few educators believed that students would do so.

In comparing the responses to questions categorised under 'educators actions' with the current literature, some differences emerged. Our study showed that the majority of educators reported that they refer their students to online videos to assist them in learning dental procedures. In contrast, da Silva *et al.'s* [15] research indicated that only a small proportion of students reported that their teachers recommend online videos as complementary content. Additionally, Burns *et al.* [2] found that most students did not recall their teachers recommending YouTube as a learning tool for clinical procedures. This indicates a significant gap between what educators believe they are doing and what students perceive their teachers are actually doing.

Our study highlights a lack of awareness among educators regarding their efforts to educate students on how to evaluate the accuracy of online videos. Although the majority of educators believed they had instructed their students on how to determine the accuracy and reliability of online content, da Silva *et al.'s* [15] research showed otherwise. A significant majority of students expressed a desire to receive guidance on how to verify the reliability of online content. Similarly, in Burns *et al.'s* [2] study, over one-third of students lacked confidence in judging the evidence base of the videos they accessed.

Concerns about the accuracy of online content were also raised several times during the focus group, which echoes findings of da Silva *et al.'s* [15] and Burns *et al.'s* [2] research. The general consensus among the focus group participants was that there is an abundance of poor-quality videos available online. This sentiment is supported by the research conducted by Syed Rashid Habib *et al.* [17] which examined the quality of crown preparation videos on YouTube. Only a few of the videos analyzed were deemed to be educationally useful, highlighting the urgent need for universities to produce their own online content to guard against the effects of having inaccurate content accessible by students.

As in any study there were some limitations in conducting this research which must be considered when evaluating these results. One limitation was the small sample size. This meant that while carrying out the quantitative analysis it appeared like there were some differences. However, these differences were not statistically significant. The small sample size and the fact that the educators who participated did so on a self-selected basis mean that we do not know if all DDUH educators feel this way. Furthermore, these findings can't be generalised to other dental schools. It also appears that one educator may have answered the survey questions inaccurately. For example, in response to one question, six educators selected the option 'I do not teach dental procedures' and in response to a different question, seven educators selected the option 'I do not teach dental procedures'. Finally, our survey questionnaire was not validated. Terms like 'reliability' and 'accuracy' were left open to educators' own interpretation, leaving room for ambiguity. Validating the survey would have established a shared understanding of the terminology used, lending more credibility to our results.

In light of this study there needs to be better communication between dental students and educators so that both parties gain a better understanding of each other's preferences. This will undoubtedly improve learning experiences for everyone. More research is required to determine if online learning directly improves academic performance in dental education or not. Previous research suggests that it improves clinical performance however its effect on performance in exams

remains uncertain.[1] Universities could also provide their students with more guidance on how to critically appraise online videos. Dental educators can lead the way by listening to their students' concerns and being open to newer teaching methods. Perhaps educators who struggle with creating video content could enroll in workshops to improve their IT skills. Indeed, limited time and funding present obstacles for educators seeking to develop video content. Overcoming barriers like these has the potential to improve student learning experiences. With that said the onus must also be on each individual dental student to take responsibility for their own learning. Until a system that verifies online content is established students should view online content cautiously.

5. Conclusions

The findings of this study suggest that dental educators have a relatively good understanding of the viewing habits of dental students. It is clear that educators are aware that most students turn to YouTube for guidance when preparing for a clinical procedure that they have not performed before. However, educators seem to be less aware that students access dental content online through Google and YouTube more often than they do through other platforms such as university websites and dental literature databases.

Although the majority of educators believe that they direct their students to online videos to assist them in learning dental procedures, the literature based on a students' perspective suggests otherwise. Educators also believe that they have equipped their students with the necessary skills to evaluate the accuracy of online content, but students appear to be unconvinced.

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Conflicts of Interest: The authors declare no conflict of interest.

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