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A case study exploring video access by students: wrangling and visualising data for measuring digital behaviour

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Every click made by a student is being captured by our learning platforms and integrated web-based tools. This store of data acts as, in its simplest form, part of an individuals' digital behaviour with measurable points of interest. But how can this data give teachers an indication that our energy, time and potentially money spent making educational videos is worth the investment? Do-It-Yourself (DIY) videos are more commonly being made by teachers to replace written or face-to-face spoken content, provide an alternative instruction format or provide assessment feedback, to name just a few. This paper explores how we can help answer the most common question asked by teachers who undertake DIY video creation: are DIY educational videos being accessed by students? To answer this question, usage data generated by Moodle (student access point) and YouTube (video host) was collected. Simple analysis tools were employed to make sense of the typical log points generated by each system. Using a first year nursing subject as a case study, this project compared student access behaviour of pre-recorded one hour weekly video lectures. The results indicated an overall declining trend in viewing the video content online throughout the semester yet an increased video access when videos are presented in small segments assembled in YouTube playlists. An additional important outcome of this study was learning and sharing how to wrangle Moodle logs and YouTube Analytics data by non-statistical experts to quickly visualise video access. This information may ultimately support video creators to evaluate their videos, spend their time more efficiently when initially making videos, support decisions to change content or update curriculum, and to ultimately re-evaluate the role videos play in learning and teaching online environments.

Keywords: learning design; learning analytics; digital behaviour

Introduction

In this concise paper, a small scale pilot study responded to the increased discussion for using data captured through access (view) logs in Moodle and YouTube for determining whether a custom-made digital resource like a video was being accessed by students and therefore worth the energy, time and money spent to create them. This study specifically asked how data wrangled and visualised from Moodle logs and YouTube Analytics database around the student's digital behaviour access of weekly video lectures could provide both educational designers and academic teaching staff with practical considerations for the potential learning design of topics and/or digital content. This study related strongly to the type of digital behaviour explored extensively by authors such as Rowlands et al. (2008), who commonly associated human behaviour with digital information seeking behaviours using log files as a record. This paper makes connections between the patterns represented by usage of online videos using available log data to determine what can be glimpsed in human (student) behaviour around online learning activities. Ultimately this will help to inform staff around the possible learning potential for their educational videos and to reinforce that more planning should be considered during the design of topic and individual digital resources, to overall strengthen the student value of videos.

At a South Australian university, the use of videos created by teaching staff has seen an increase in recent years, due in part to the increase in student numbers which cannot be housed together in a single lecture facility. Additionally, there is an increased demand for learning flexibility for a blended on-campus and distance/off-campus study that is supported by a range of technologies such as web-based tools and online learning platforms. This is reiterated by Heimann and Pittenger (2000) who stated that videos, as a form of communication, had many benefits to education, especially when a voice presentation is integrated with lecture slides. However, video as a communication tool has the potential to be of high value beyond the traditional lecture style and should not be confused with the recording of a traditional face-to-face lecture. The new wave of videos in education are done by the lecturer in a low-tech way, using simple video recording and editing tools, and are hosted on a learning platform or cloud storage tool to be accessed by students as part of their course resources. These videos are usually heavily content-based, as a way to replace or strengthen the traditional lecture, but an increasing number are being created for improving visibility of a lecturer or tutor in an online space (Borup, West, & Graham, 2012; Kelly, Lyng, McGrath, & Cannon, 2009).

It is well recognised in educational fields that multimedia materials are increasingly being used in a range of learning and teaching activities to harness learner attention and interest through the delivery of an eLearning system or education-focused website (Chen & Sun, 2012; Copley, 2007). The education field also recognises that there is potential for students to enhance their learning potential by using media-rich resources, as created and shared by their teachers (Ragusa & Crampton, 2014). Research conducted by Wells, Barry, and Spence (2012) indicates that when videos (and potentially other media) are well-designed, are assessment-focused and readily available when and where students need them, videos have the potential to improve student satisfaction and grades. Another positive value of videos is their potential to build and maintain a social presence and display quality instruction in a highly online environment (Homer, Plass, & Blake, 2008; Kim, Kwon, & Cho, 2011). Zhang, Zhou, Briggs, and Nunamaker (2006) reiterate the value of videos to student learning outcomes when interactivity is included. These considerations should be made when designing topics for online and blended learning environments where video and other multimedia tools and resources are utilised as part of the online learning design.

Research design

This study explored what was being captured by the learning platform (Moodle) reports and YouTube (Analytics), with an emphasis of not using sophisticated statistical software for analysis, but relying on quick visualisation tools available to all staff. In order to answer the research question; are DIY educational videos being accessed by students? The principle behind the decision to use access log data, was to replicate what a non-statistical expert academic teaching staff member could readily use to view how/when their students access digital content, using the example of the weekly online video resource. Microsoft Excel with a pivot table and graph function was one analytical tool used throughout this study, simply because it is accessible to the majority of university staff and simple to use. YouTube Analytics dashboard was a new tool trialled for its value in visually displaying the *views* of individual videos, a group of videos and playlists.

The main aim of this case study was to investigate how Moodle logs and YouTube Analytics could be used to quickly visual the use of videos accessed by students, whilst also testing the potential value in dividing one hour lectures into 2-10 minute sections, which are then combined in a YouTube playlist. Overall this project's aim was to visualise access data of content-focused pre-recorded video lectures in a large (n=406) cohort of first-year nursing students in 2015. Alterations between the one hour videos lectures used in 2014 and segmented 2-10 minute videos presented in a topic playlist structure in 2015 are presented. This study uses two years of access data on weekly video lectures and hypothesises that flexible use of streamed segmented lecture videos stored in YouTube playlists will increase the access of the videos compared to those stored as 1 hour lectures in 2014 (n=413). The study continues the discussion of whether the energy, time and money it takes to plan, create and publish videos for replacing face-to-face lectures is a reliable form of information transfer for students if the majority of students are not accessing the content created.

Results and discussion

The potential investment of time and money it takes a non-video expert to make digital content-rich resources which is engaging for the audience and their importance as a replacement to the one-hour lecture cannot be underestimated. The videos created for this study used a balance of low-technology for their creation (Microsoft PowerPoint and Camtasia Studio 8) but were content-rich using images from the topic textbook. So how do we know they are being accessed? Moodle logs in the learning platform seemed to be a simple way forward. In 2014 student access of pre-recorded one hour lectures for ten weeks indicated only 46% (n=190) of students watched an average number of supplied videos (9 of 24 videos), but also as the weeks progressed, the trend continued to display a declining view of lecture video content. In 2015, the Moodle logs identified 54% (n=220) of students watched an average number of supplied videos (6 of 12 videos). While the number of videos changed between the years, the length of each video did not change. This was due to the repurposing of the videos, where two videos on the same content (Part 1 and Part 2) were merged into one playlist divided video. This resulted in the number of videos created and presented to students dropped from 24 to 12 between 2014 and 2015. Overall, access to video content was an important component to the design of the topic, as students were encouraged to access the video resources before their practical classes because the weekly theoretical content was only delivered digitally through video.

Figure 1 indicates that Moodle logs for the access of lecture video by students in 2014 (n=413) and 2015 (n=406). The results are visualised using Microsoft Excel pivot table chart and are meant to be a guide for staff to identify the access of the video content, not a measure of engagement. Interestingly, the percentage of students in 2014 who accessed all 24 videos at least once was 5.33% while in 2015 the students who accessed all 12 videos at least once is 13.79%. The results indicate that the number of videos presented to students is an important decision, as too many and they are unlikely to access all of them.

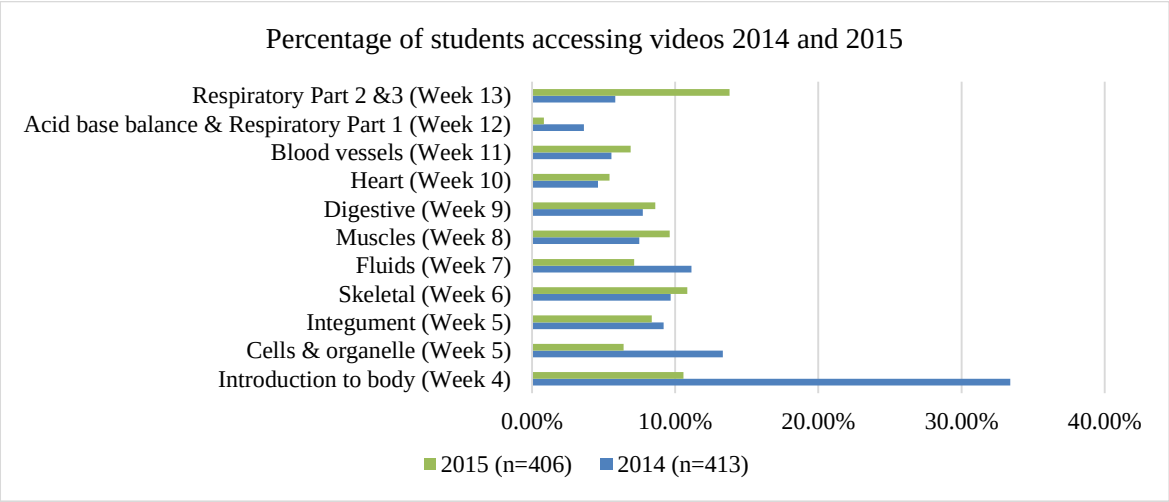

Figure 1: Comparing 2014 to 2015 video access in Moodle

Taking on board the low measured views of videos in semester 1, 2014, obtained from Moodle reports, a meeting between the topic coordinator and an educational designer resulted in editing the one hour video lectures used in 2014, into segmented shorter concepts (2-10 minutes in length) and stored in an unlisted YouTube playlist by topic/week. This playlist was then embedded into the online platform topic for semester 1, 2015, for students to access when needed. A total of eleven playlists were created, one for each unit of study within the topic. By using YouTube as a video host, the aim was to visualise access data of videos to determine if the use of playlists improved the video accessibility for students to review sections of the weekly content because of its menu-like feature. All videos were hosted in the topic coordinators' YouTube channel. YouTube also provided YouTube Analytics for measuring the *view* (click) of videos where no users were identifiable (See Figures 2A and 2B). Within the YouTube Analytics section is a valuable tool *Groups* when connected to the *Audience Retention* option, provides visual displays of the average view (access) duration of each video within a group (a *group* being a collection of videos or playlists). The flexibility of this feature enabled comparisons to be made between video segments or across playlists. This topic created all eleven playlists into a single group for analysis (Figure 2.A) and created an independent single playlist for each week's content (example for Week 4 provided in Figure 2.B).

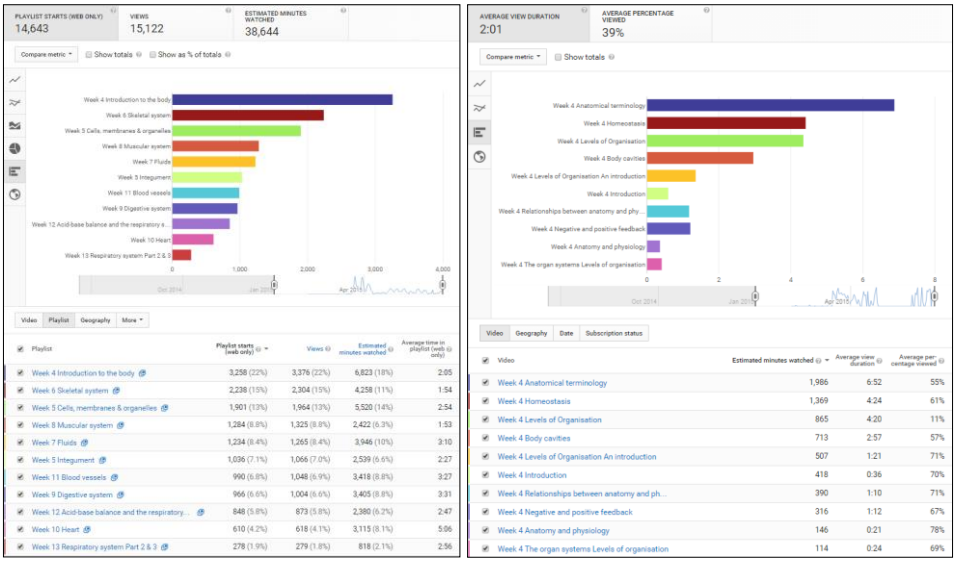

Figure 2: Visualising possibilities in YouTube analytics samples (2015):
A: comparing playlists in topic; B: individual playlist videos (an example of the week by week playlists)

The audience retention feature (determined by length of time video was accessed) captured by YouTube has been invaluable throughout this study, as it provides an overall view of the video visually with the view response from students at any given point in time of the video (illustrated in Figure 3). Interestingly, the YouTube Analytics summary for 2015 videos by topic playlist (Figure 2.A) identified that of the 118 videos (comprised of 2-10 minute video segments of the original 1 hour video) loaded into YouTube, the average view duration is 2:33 minutes per video. As illustrated in Figure 2.A, the trend displayed by the views in all playlists indicated the typical dwindling of access for later weeks' content (Week 4 is represented by blue and Week 13 is represented by red). The same can be applied for an individual playlist, as illustrated in Figure 2.B. Using YouTube Analytics for the example of Week 4 playlist containing 10 short videos, we clearly and quickly highlighted the average duration students spent for each section (content video) within the playlist. Additional filters can be viewed using the *metrics*, which are defined as individual measurements of user activity.

Overall the audience retention feature for each video displayed an interactive visual dashboard, enabling the user to pinpoint the section of the video that is poorly viewed (see Figure 3). Audience retention is defined by Google (2015) "as an overall measure of your video's ability to retain its audience" (para. 1). There are two types available; *absolute* and *relative*. The most useful type is the absolute which "shows the views of every moment of the video as a percentage of the number of videos views" (Google, 2015, para. 1). Once again, the emphasis of where (content location) students were spending their time is visually obvious and using the audience retention preview (see Figure 3), the user can play the video at the point where the majority of students appear to stop. This may lead to last minute changes in teaching focus (just-in-time direction), or highlight that the video had not been edited correctly (as case in point for Week 5 where a 20 minute black gap was accidently left in between video segments). Further information may be asked from the students during class to determine whether students were coping with the content, or rather not coping. This would allow for targeted concepts to be evaluated in a face-to-face class or online discussion, or through the use of knowledge checkpoints (quizzes) as used in this topic. As illustrated in Figure 3, the YouTube audience retention visually demonstrated where in a video the majority of viewers switch off (stop watching defined by stopping video). The definition for the majority of viewers for our purposes was 50%.

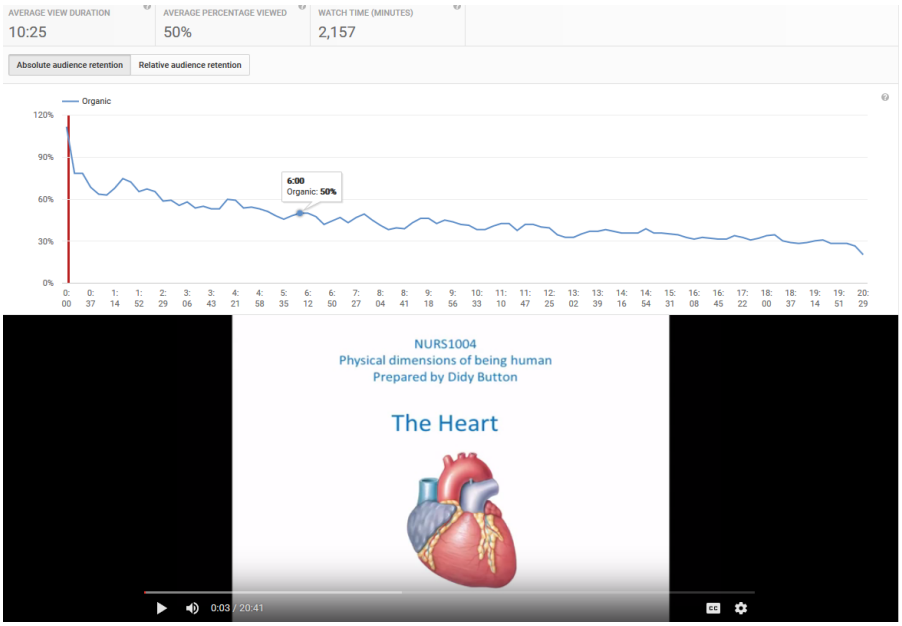

Figure 3: YouTube audience retention example for the heart topic in 2015

As video segments were on average 2-5 minutes in length across all eleven playlists, the relationship to the required practical laboratory knowledge was not used in the study, however the potential to identify the point at which the video was stopped may be useful in determining whether the content being covered is appropriate and/or required prior to a practical lesson. In the example provided in Figure 3, the anatomy of the heart has a 2 hour practical laboratory class. If only 50% of the video content was played to the end by half of the students, would the teaching staff expect a different level of preparedness on the whole from their students than for the 23% of students who did play the video to the end? It may be considered that the nature of the video lecture, a voice over a PowerPoint slide, may not be a suitably engaging for learning basic heart anatomy. Would you question whether this content could be taught more visually, thereby making use of the video content? These are some questions which have arisen from analysing the 2015 data, but many more could come to mind in moving forward to consider the use of videos in 2016.

Conclusion

So do you know if your DIY educational videos are being accessed by your students? The potential access of videos created by the teaching staff is an important consideration in the future of tertiary education. Workload time required to develop the necessary technical skills required to learn video software may be a significant investment. Additionally, the potential cost to create online videos can come from a time or monetary perspective. This case study highlighted the potential value in not only supporting teaching staff to learn how to create engaging and good quality educational videos, but also to be able to measure basic access data by using simple data analysis tools to determine how the videos are being accessed. To help up-skill teaching staff in video development, it is recommended that supportive training workshops, guiding educational designers and accessible technical support are required as the demand for creating quality teaching videos continues to increase. While Moodle logs is readily available to all teaching staff at this university, it is acknowledged that not all teaching staff have the knowledge to interpret the data collected, nor manipulate the data into visual logs to gain insight. Whilst YouTube provides a more valuable analysis because of its visualisation power, Moodle logs could reinforce where a student went next online in Moodle, whereas YouTube was restricted solely to the videos hosted in the tool. Further exploration into YouTube Analytics potential is warranted as to how it can be used to design the online space to improve learning potential for students, but also how it can be used to change teaching practices in face-to-face classes. However, the power to use simple data analysis tools enables anyone to analysis how videos are being accessed and whether this has any impact on the learning potential. Moving forward, other considerations for university staff using analytic tools could include learning how to best encourage the creation of quality and engaging video content. Supporting approaches for the sustainability of the video content and identifying the value of interactive quiz throughout the video content may need further considerations. Ultimately, how to improve audience retention to increase learning potential is required as we move forward in this space. Additional studies into student opinions, motivation and engagement relate to how they want to use content-related videos would also strengthen any future use of these types of videos in the online and blended tertiary environment.

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