

How a Video's Production Impacts Student Engagement

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ABSTRACT

Reflections on a developmental research process into the use of video to accelerate learning and engagement in and out of the classroom lead to work towards a framework for development of video resources that is concerned with five characteristics: Audio, Visual Quality (Lighting and Objects), Length, Instructors' Delivery, and Editing Techniques. An experimental study of how video production decisions can influence learner engagement with online educational videos is presented. The paper as presented, is also to be treated as a practical guide for the identification of key factors in video content that raise subject engagement and subject information retention. We assert that it is necessary to be aware of the factors responsible for the development of successful online learning videos.

Keywords: Flipped Classroom, Video Tutorials, Engagement

1. INTRODUCTION

Over the past three years, lecturing staff on the Bachelor of Information at a New Zealand polytechnic institute have been examining and developing video resources to support a blended learning environment. Up until this time, like many institutions, the videos were being developed in an improvised manner and without a suitable theoretical structure (Mishra & Koehler, 2006). The institute undertook the development of new certificate and diploma courses within the Information Technology program. As part of this initiative, video lecturing resources were created and used to support the delivery of technical demonstration and theoretic components for the new courses.

This paper summarises the reflections of the instructors that were involved in the development of the video resource framework, and the experiences of the learners who observed two "diversely developed" video resources. Furthermore, this paper focuses on the categorization of factors that are responsible for the development of successful online learning videos. The outcome can be usefully applied to support educators in their development of engaging video resources.

2. BACKGROUND – FIXING THE FLIP

Subject matter experts are now being asked to design all new courses with the capability of it being all taught online. Course development within the IT sector of the polytechnic institute has shifted its design towards a model that can be used for online students, as well as with students on campus.

The Digital Technology department had already begun to experiment with using video tutorials in and out of the classroom. There were diverse results found in student engagement and information retention. When used in a flipped classroom approach to teaching and learning, problems with implementation in the use of video in the "flip" emerged.

The tutors were under the assumption that they could set videos for students to watch before class, and then they would discuss the content in depth in the classroom the next day.

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The main problems experienced were that the students were not watching the videos, or only watching a small portion of the video. Students also could not recall important aspects of the videos.

The goal in the flipped situation, was to discuss the video in the classroom to expand upon the subject matter. However, this was limited to only the students who had watched video. The assessment results showed that some of the students who had watched the video, struggled to retain the information that they had seen.

To resolve these issues measures were put in place, in a form of learning design "framework", as follows. Questions were developed about the content of the videos. The students were informed that there would be a short quiz on the video at the beginning of the next classroom session. This was followed by a classroom discussion of the video. After the students had discussed of the video, they were given a second quiz on the video's content.

Applying the learning design to the flipped classroom gave a structure to the activities. Resultant outcomes from applying the framework to use of the videos in the flipped context showed that it improved classroom engagement and retention of the subject matter. However, the students seemed to watch and recall some videos abundantly better than others. This raised the question, why are some of the resources so successful while others seemed to completely disconnect from the students? What pedagogically affective factors can be deployed to ensure the video resource is engaging to the students?

To move forward towards a design model for better video content, instructors needed to investigate characteristics of video that produced an appropriate pedagogic form in the video for this kind of environment. The intention here is to describe outcomes from the continued development of a framework which could be used to support the learners' engagement with the new online resources, that is treated as a case study in its development.

3. THIS CASE STUDY: Increasing Video Resource Engagement

In 2017 the instructors at the polytechnic institute from the Bachelor of Information Technology started a project with a

goal of investigating, designing and developing engaging resources to support the requirements of the new courses.

The objectives of the project were to:

- Produce quality resources, increase student engagement and decrease barriers in participation in tertiary study.
- Pave the way for future online delivery models which then can be extended into other courses throughout the degree.

The choice was made to video a lecture without any preparation. Positive and negative aspects of the video would be analyzed and used to develop key features to work as a guiding framework for development. The effectiveness of the framework would then need to be tested.

The outcome of the initial video presented five primary features that would be used as the development framework.

- Audio
- Visual Quality (Lighting and Objects)
- Length
- Instructors Delivery
- Editing Techniques

The decision was made to trial two different delivery methods. Video 1 was to be developed with what was found to be a solid video design framework. Video 2 was to be developed with disregard to any method or framework.

The framework that was developed focused around the five key features listed above, to distinguish how the following aspects of the videos affects the students' engagement with the newly developed video resources. During the process of developing the resources, these key features were identified as having a major impact on the videos quality.

3.1 Audio

3.1.1 The Importance of Audio

Over the past year lectures at NMIT have learned that the quality of the audio is a just as important as the quality of the visual aspect of the video. (Skalski & Whitbred, 2010) produced research which examined the engagement of audio and graphics in video games. The aim of the research was to better understand the role of the audio within video games. They found that the game with the better audio had stronger engagement regardless of the visual graphics of the game.

Instructors can create a visually appealing video which is striking to look at but it doesn't matter if our students can't hear what is being said.

Audio Pitfalls

3.1.2 Awareness of Audio Pitfalls

There is a lot to keep in mind when developing quality audio within videos. There must be awareness of the environment and an awareness of what the microphone is going to pick up when recording. For example, if the camera happened to be placed to a desktop which is making a low humming sound, well that sound is also being recorded throughout the lecture. Once recorded it is a very tedious task to attempt to remove such sounds.

If the camera was placed at the back of the room and the camera's microphone is being used, then most likely the sound quality will come out low. People viewing the resource shouldn't have to place the volume a 100% to hear the lecture which can still sounds like it is being whispered.

Volume fluctuation throughout the video is also not ideal and significantly reduces the presentation quality. The students

shouldn't have to adjust their volume up and down throughout the presentation.

3.2 Visual Quality

3.2.1 Surrounding Environment

After several takes it was later discovered that there were objects within view of the camera that were originally thought would have been far removed from the scene. These objects were not originally intended to be included in the resource. When creating a video, it is good to confirm what is actually going to be in the shot prior to recording the video. When using a room in an office or lab, make sure that it is declutter. Unless the instructor recording the video has a pristine space with nothing out of place, then the location should be tidied. If for some reason this is not an option, then undesirable objects should be removed from the shot.

3.2.2 Lighting

According to Jackman (2002) the most common mistake beginning video shooters do is overlook the importance of good lighting. Lighting is important for making a visually attractive video.

When making a video, the production team must make sure that there is enough light in the room. People don't realize how off-putting a dark dingy recording comes across. Instructors want their students engaged in their delivery of content. The students want to be able to see them and whatever the instructor might be presenting. Remember to turn on the lights and open those curtains. A bit a natural light always looks the best.

There must be enough light to stimulate the electronics within the camera to a certain degree (Jackman, 2002). It won't matter if the instructor can see, if the camera doesn't get enough light, the video's quality is doomed.

3.2.3 Body Positioning

People often tend to stand right up against the wall when they create their videos. Besides looking like a mugshot, the shadows can be a distraction. Take a couple steps away from the wall. This will remove the shadow from the scene, or at least won't be so dominant.

3.3 Length

3.3.1 Keep it Short

While some believe that the length of the video is subjective. Video length is a major factor when it comes to students engage with our videos. Not all viewers have an adequate attention span to review long videos (Hartsell & Yuen, 2006). (Guo, Kim and Rubin, 2014) the optimal video length is only six minutes or less. Their research suggests that students frequently make it less than halfway through videos that extend over 9 minutes. Often the lecture is going to take more than six minutes, so how can content be produced in such a limited amount of time? (Hartsell & Yuen, 2006) state that developing several small, focused videos is a superior method compared to having one lengthy video.

3.4 Instructor's Delivery

Not too long ago, only average, low-grade audiovisuals media recordings could be shared over the net. This prompted some researchers to claim that instructors' nonverbal actions weren't as relevant as the verbal communications (Arbaugh, 2001). This is no longer the case. Technology and pedagogical trends worldwide have influenced a shift from brick-and-mortar classroom to a digital space (Greenberg & Zanetis, 2012). Today's technology gives us the ability to create quality videos.

Displaying enthusiasm does not necessarily cause learners to retain more details of the content but it does inspire them to use

the material (Ashby, 1999). Instructors want their students to feel engaged in developed resources and feel engaged with its delivery.

3.5 Filming Techniques

There are plenty of techniques available when it comes to shooting the video. The primary focus was mainly on two approaches, the one take and the spot take.

3.5.1 The One Take

The first approach of creating a video is to do it in one take. (Brunsell & Horejsi, 2013) the instructor needs to outline their presentation with some visual aids on the whiteboard. Then they record themselves working through the items listed on the board. It is a simple approach and it gets the job done quickly. By having the instructor in the video, the students connect with the content and their instructor.

This technique has been used several times before and the results of these experiences exhibited reduced post production time. The reason there is less editing is because it is more of natural approach and things tended to be left exactly the way they were recorded. We note, getting things done in one take is an approach which is sometimes easier said than done.

3.5.2 The Spot Take

Another technique is the same spot take. The best way of doing this is for the instructor to sit in a chair or pick a spot on the carpet where they will stand throughout the recording of the video.

The video can be broken up into small portions and be recorded separately. For example, if an instructor was going to discuss ROM and then RAM, they could video themselves discussing the features of ROM and then stop the videos recording. The instructor then knows what is required for this portion of the video and it is now safely recorded and saved in a video format. If the person being filmed was to fumble his or her words in the next few minutes it wouldn't affect the first portion of the video. The person being recorded could then go back to their seat or the place that they were standing and begin the next recording. By doing it this way, they are essentially creating two different videos. If they wanted to, they could combine the videos together with almost any video editing software. Because the person being recorded is in the same position in both videos, it gives the illusion that it was all done in one take. This gives a much more polished look to your video.

3.4 Editing Tools

While almost any digital camera would have been sufficient. The instructors had access to a Canon 70D Camera with a tripod to video our lectures.

Though there are countless video editing applications available, Adobe Premier and Adobe After Effects was chosen to edit the video. These tools can remove the over exposed footage, add text to the screen and other effects.

Being aware of the environment will reduce issues with quality of the audio. There will still be occasions where adjustments will need to be made. The chosen fee software application Audacity was used when making audio modifications, such as reducing additional noise for the audio.

Once satisfied with the video footage and the audio, the video can be rendered into a HD QuickTime video format. This format seems to keep a good balance of video quality and the file's size.

4. DESIGN, DATA COLLECTION AND RESULTS

4.1 Development Results

Once the key features were clearly identified, two different videos were produced by treating these features as a framework. The form of the framework is shown in Table 1 and Table 2.

For the first video "Video 1", the features were applied in positive way. The goal was to fashion a superior quality video resource that would increase and maintain engagement. The camera and microphone were placed near by the instructor and all additional devices were turned off to reduce any noise. The room was well lit. The video was just under 6 minutes long. The instructor spoke passionately about the material which was being covered. The video was edited with fading into the scene when the video started and fading out when it was complete. A filter was created to make the video more attractive to the eye. Text was added to appear on the screen when the instructor was discussing new regarding the material. Finally, the video was rendered and ready to be viewed. Overall, editing and design of Video 1 took approximately six hours to complete. Additional special effects were added which increased the time it took to develop the video. Subsequent iterations could be completed in a shorter timeframe if the additional CGI was excluded.

Table 1 Design of Video 1, quality and details of the features

Video 1		
Features	Quality Standard	Details
Audio	Good	Clear sound with no background noises.
Visual Quality	Good	A well light room
Length	Short	The video was kept under 6 minutes.
Lecturer Delivery	Good	The lecturer gave an energetic delivery
Editing Techniques	Good	It transitioned smoothly.
Reasoning behind the development of the video.		
Video 1 was designed by applying a high quality featured frame work during the development of the video.		

The presentation of Video 1 was viewed in level five class's usual timeslot. All eyes were on the video which was being projected at the front of the room. Once the video had finished the students gave enthusiastic applause. A discussion around the content of the resource was then explored verbally with the students and their instructor. The students recalled key elements of the video. Everyone was actively engaged with the discussion of the content within the video resource.

Table 2 Design of Video 2, quality and details of the features.

Video 2		
Features	Quality Standard	Details
Audio	Low	Hard to hear.
Visual Quality	Low	Lights were left off and curtains closed.
Length	Long	The video was 15 minutes long.
Lecturer Delivery	Boring	The lecturer didn't act excited and kept his voice monotoned throughout the lecture.
Editing Techniques	None	The lecturer didn't do any editing at all.
Reasoning behind the development of the video.		
Video 1 was designed using the frame work that was developed to increase engagement. Video 2 was created by disregarding what was considered a good quality frame work.		

The second video, "Video 2", was created using the framework to produce a lower quality design, as shown in Table 2. The length of the video was 16 minutes, which was 10 minutes longer than the framework had suggested. The camera and microphone were placed towards the back of the room next to a computer which reduced the quality of the audio. The curtains were left closed and the room was dimly lit. The instructor's delivery lacked any enthusiasm in regard to the content. No video editing tools were used.

Video 2 was presented to the level five class after they had already watched and reviewed Video 1. About three minutes into the video the students' eyes started to wander. Once again, a discussion regarding the content followed but it was very short lived, as the retention of the information covered within the video was low.

4.2 Video Research Questions

Four questions were used to determine student engagement, their perception of the quality of the video, and to see if they would watch it outside of class time, as follows in table 3.

Ten students in a level five course watched Video 1 and then were given four questions, regarding their engagement with the video. After that the students were shown Video 2 and were given the same questions regarding Video 2.

Table 3 Questions as presented in the survey. For questions 1, 2, and 4 the quality measure is identified. In all the rationale for each is described.

Question 1		
Did the video manage to keep your attention throughout the entirety of its duration?		
Answer Options	Quality	Description
Completely	Extremely High	Managed to maintain engagement throughout the entire video.
Mostly	High	Managed to maintain engagement throughout most of the video.
Partially	Medium	Managed to maintain engagement for some of the video.
Not at all	Low	There was very little engagement during the duration of the video.
Reasoning behind this question?		
This question was designed to establish the differences of engagement over the entirety of the videos watched. This data will be used to evaluation of engagement of the videos.		

Survey Question 2		
How would you rate the quality of the video?		
Answer Options	Quality	Description
Fantastic	Extremely High	The video quality was found to be of a very high standard.
Great	High	The video quality was found to be of a high standard.
Good	Medium	The video quality was found to be of a respectable standard.
Not well	Low	The quality of this video was below expectations.
Reasoning behind this question?		
This question was designed to establish the student's opinion of the quality of the video. This data will be used to evaluation of engagement of the videos.		

Survey Question 3		
What key features of the video do you think could improve this video?		
Answer Options	Description	
Length	If selected, this feature was believed to negatively impacting student engagement.	
Audio	If selected, this feature was believed to negatively impacting student engagement.	
Delivery	If selected, this feature was believed to negatively impacting student engagement.	
Lighting	If selected, this feature was believed to negatively impacting student engagement.	
None	If selected, the student believed that all the features were of a high standard quality.	
Reasoning behind this question?		
The students were asked to identify the feature that they believed was impacting the quality of the video and could be improved. The students could choose the length, audio, delivery, lighting or none. The students could choose the option of none if students believed that that all features were of a high quality. They were only allowed to choose one answer. This will help the instructors identify which features the students felt were having the most negative impact within both videos.		

Survey Question 4		
Who would watch all of the video outside of class time? You can watch it a home, some place on campus or wherever suited you.		
Answer Options	Quality	Description
Very likely	Extremely High	If a person selected this option they were almost certain to watch the video outside of class time.
Likely	High	If a person selected this option they were likely to watch the video outside of class time.
Possibly	Medium	If a person selected this option they might watch the video outside of class time.
Not likely	Low	If a person selected this option they were most likely not going to watch the video outside of class time.
Reasoning behind this question?		
This question was designed to establish what would be the likelihood of each video being viewed by the students outside the standard assigned class time. Would the video with the applied framework in place have a different result from a video without what is being considered a good quality framework?		

4.3 Charts depicting a comparison of students' perceptions

Figures 1 to 4 present a comparison of student responses to these four questions.

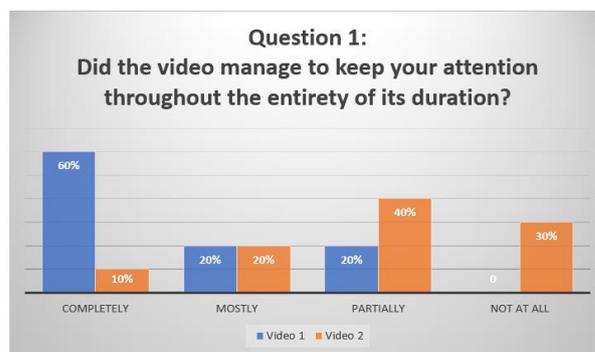


Figure 1. Student attention.

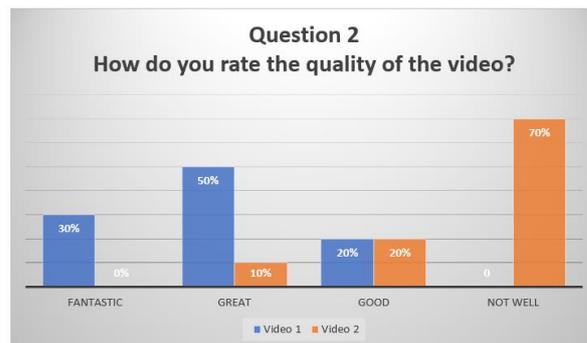


Figure 2. Students' impression of quality.

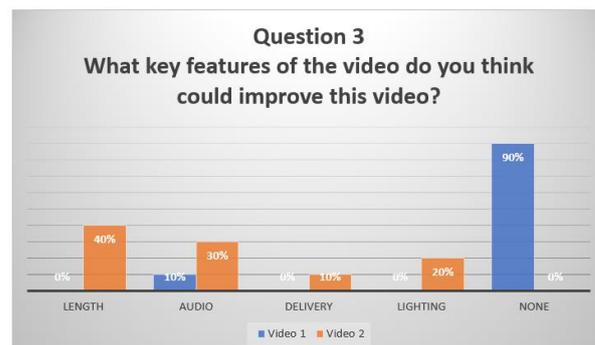


Figure 3 The feature of the video that needs improvement

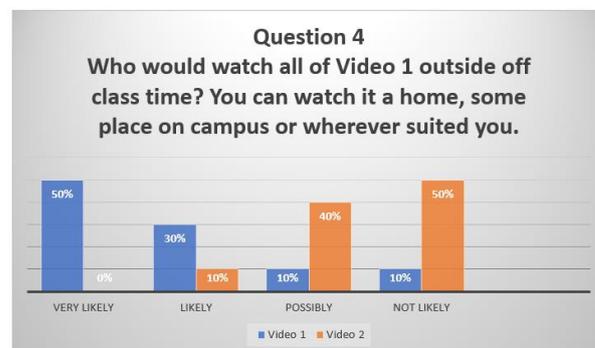


Figure 4 The proportions of students who would watch the video outside of class time.

5. DISCUSSION ON RESULTS

The graphs confirm that 100% of the students believed that Video 1 was of a respectable quality. 60% of the class stated

that Video 1 held their attention for the entirety of its duration, compared to only 10% of the students that watched Video 2. 90% of the students said that they would have watched the Video 1 resource outside of the normally scheduled class time. On the opposite end of the spectrum, 50% of the class alleged that they wouldn't view Video 2 outside of the normal scheduled times.

The length in which Video 2 ran for was identified to be the element that proved to be Video 2's primary issue. When the students were asked what key feature could improve Video 2, 40% stated the videos length. Video 1 was almost a third in its length and the results confirm that the students were satisfied with its time duration. The class found that the video with shorter duration was as positive factor of the video. This research advocates that the video's length has a huge influence on the learner's engagement. In terms of the length and learner engagement, less is more.

While length was chosen to be the primary element that effecting the standards of the video, the audio was also found to be another major stakeholder in the development of the resource's quality. Of the four key features that made up the poor frame work used to develop Video 2, 30% of the students chose audio as the element that they would change to improve the video. This research suggests, when choosing or developing video resources as an educational media, it is paramount that audio is of a high standard.

Overall, the developed framework applied to Video 1 has shown a positive impact on learner engagement with the resource. The results of Video 2 confirm that video by itself will not prove to be an effective media if it is poorly designed (Koumi, 2014).

Planning is essential, the better prepared, the easier and less complicated the production process will be. There are lots of elements to consider but when done correctly, educators can create exciting educational content. When done with minimum effort the benefits of the resource are substantially reduced.

6. FUTURE WORK

This research has exposed that there are many different elements to consider when attempting to provide a multimedia video resource which invigorates our students. We would like to extend the study to find additional aspects of the elements that could improve engagement.

- What differences would we find between video resources made available over the web compared to videos that were developed and include their instructor? We would like to compare the effect on student engagement.
- How does a video with two people having a conversation regarding the content compare to one person lecturing effect the students' engagement?
- How do the resource's recorded location influence engagement? Does changing the location of the filming have any impact on the learners?

7. CONCLUSION

Videos have emerged as a dominant medium for education purposes and has become more and more of an expected resource (KALTURA, 2016). Instructors need to be aware of the factors that affect the development of successful online learning videos. The videos need to be interesting for the students and appealing for the visual learners whom might learn best by watching short engaging videos.

There is an attention to detail and expectation of quality from our learners, even if they realize it or not. Facilitators must take it upon themselves to become aware of what supports the students drive to learn in the classroom and within the digital space. It is important that the instructors become aware and confident in selecting or creating resources that will have the greatest impact on the learners.

The take home message for the instructors is, plan for maximize learner engagement, specifically for online video formats. Traditional methods might not be the best option for creating or using a digital education resource. Frame works can help with the amalgamation of great content and engagement. By fusing them together, exiting, motivating learning can begin to take place. Students will be inspired and more inclined to review the learning resources. Remembering that not all content is created equal and these key aspects of the frame work can help differentiate between the average and a great video resource.

8. ACKNOWLEDGEMENTS

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