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Using YouTube Videos to Explain Difficult Database Concepts in the Classroom

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Using YouTube videos to explain difficult database concepts in the classroom

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Abstract:

We as lecturers have to adapt to a changing student audience. It is no longer good enough to teach without technology, especially in technology-driven subjects, such as advanced databases. Students learn best with a diverse teaching approach, and as part of improving our students' capabilities, YouTube videos, custom-made with the course content, were introduced in an advanced database course. The YouTube videos were aimed at improving student understanding by practically illustrating database scenarios where the main topics of the lectures were addressed. Students were asked to complete an anonymous survey based on their experiences. The groups' responses clearly showed that the majority of students benefited from the videos, with 64% of students indicating that the videos were helpful in understanding difficult concepts, and that 77% of students watch YouTube videos when they need a step-by-step approach to grasp difficult concepts. The overall results indicate that the future of academic teaching no longer only lies in formal lectures, but also adding technology to enhance students' experiences.

Keywords: Advanced Databases, 21st century learner, teaching approach, YouTube videos

Introduction

In 1965, Marshal McLuhan said: "*One day, people will learn through electronic circuits*" in Karsenti and Collin (2011), they also quoted Edison who in 1987 said "*It is possible to teach every branch of human knowledge with the motion picture*". Looking at these remarks, and realizing that already in 1987 the motion picture was seen as a tool to teach, the influence this has on us as academics, or let's rephrase, on us as teachers, is unavoidable. But, the truth is, these technologies have not yet fully used to their potential (Karsenti and Collin, 2011) because the "digital video has simplified the process of creating, viewing and sharing as never before". As academics we have to go through a rethinking process of how we teach students and how these students in fact learn and interpret knowledge. Clarke & Clarke (2009) acknowledge that students in today's era need very different skills than what we as educators are used to teach. Students should obtain abilities and competencies which will smooth their integration into the social and personal life, particularly their creative thinking Dinica Dinescua, Miron (2010). This is due to the fact that except for the fact that we are teaching an entirely new type of student, we are also teaching a diverse group of students. Ashraf (2009) explains it very simply as "always on/never-off" and Conrad and Donaldson (2012) say that information is

available at the "flip of a switch". Prensky (2001a) explains that the "new" student entering campuses have literally grown up with technology and she calls them the digital natives. This means that the students entering our campuses in today's "modern" era has had some kind of exposure to technology. This is however the one side of the coin, on the other side, we should be careful of the digital divide. For some students, their biggest concern was never what laptop or cellphone they have, but rather what we will eat, will they sleep warm, and in some cases this is still their biggest concern, even as students studying at a higher education institute.

This paper focus on a group of second year students enrolled in a database course at a higher education institute and how the use of customized YouTube videos was used to explain difficult database concepts.

Literature review

The 21st century student

Kirkwood & Price (2005) state that students, these days, have the ability to access information from any location in the world, without boundaries holding them back. However, they do note that this could in fact allow for an even greater disadvantage if one looks at the 'digital divide'. Prensky (2001a, Prensky, 2001b) continues by saying that the graduates entering today's campuses, have not read more than 5000 hours in their entire lives but have spent over 10000 hours playing video games. Can we really keep on ignoring this different type of student entering our campuses? And even though we live in a world where technology is rapidly expanding and developing each day, social media is even newer and more actively used by the students sitting in our classrooms today. "*Social media may be new to us, but today's classrooms are filled with a generation of students to whom social media are a new way of life – and who cannot envisage a world before Internet and digital technologies*" (Ferris and Wilder, 2013). Selwyn (2009) notice that the 21st century student learns in ways far removed from a formal setting such as a school or library. These students have "developed" processing skills which is essentially different than the "older" generation IT users. These students learn at high speed, process visual images and connections with ease. Prensky (2001a) acknowledges that today's student think and process information on a total different level. Ashraf (2009) mentions techno-savvy and digitally-literate, and tying it back to lecturers, "*students demand excellent, inspired, interactive teaching*" (Ashraf, 2009). And because even adults are engaging more in this social media phenomenon, it leads to an increase in the use thereof in the workplace (Ferris and Wilder, 2013) and therefore we as educators cannot ignore these technologies, by engaging with the students through social media, we are equipping these students for their future workplaces. Social media in this context is not using a social network such as Facebook to engage with students, but rather the use of any medium of technology to engage with various communities.

What constitute a good learning experience

Clarke & Clarke (2009) noted that due to the ever changing and evolving technology and era that we currently live in, training does not only mean portraying knowledge, but rather teaching how to adapt

to change. New literacies, new approaches to learning, "a shift in the deep structures of consciousness" all have an influence on the way we now need to teach.

The skills we as educators need to portray to our student should include thriving on chaos, working with very diverse groups not only in a face-to-face situation but across continents, and creating but also sharing ideas and decisions based on information which might not be real. "*The need to reform should go beyond changes in curriculum content, technological infrastructure... It goes to the need to create learning contexts that will result in new kinds of mind altogether*" (Clarke and Clarke, 2009)

Using technology to teach

Examples of new methods to teach are ample. Lecturers can incorporate collaborative learning, small learning communities and technology-based course transformation (Wildavsky et al., 2011). The Internet has become an easy and inexpensive way to learn. Not only that but ICT has the power to deliver universal knowledge and thus provide universal access for these students (Karsenti and Collin, 2011) which exceeds Edison or McLuhan expectations.). Connolly, Stansfield and McLellan (2006) explains that there is a substantial amount of technical knowledge that students should comprehend and that it often leads to the lecturer discussing the concepts and the students are then merely passive listeners. This is especially true in subjects such as advanced databases. One way of transferring the knowledge of the abstract concepts to more concrete examples is by using YouTube videos in class. Being one of the most popular video sharing platforms (Jenkins and Dillon, 2013), students should be familiar with using YouTube, and can even be "Excited to use technology in a class setting". Ten hours or content is being added to YouTube every minute (Ferris and Wilder, 2013), YouTube videos can be accessed at any time by the students and offers a range of benefits. These benefits are anytime/anywhere access; support-on-demand; instruction enhancements and simulating one-to-one teaching, (Yi Xiao et al., 2004). One other benefit is that the YouTube videos can simulate a real-life database, making the example current and relevant.

Research question

To remain a sought-after university in South Africa, we as teachers need to adapt to the changing 21st century student, and one way of doing that is by following a blended learning teaching approach, where concepts are taught with different delivery modes (Lim et al., 2014). Videos act as an additional learning tool, ensuring that the mode of delivery is one that most students can relate to. One such a tool being used to teach is YouTube as YouTube is widely known and used. Students create memories by either visual or audio sensory input (Fleck et al., 2014), and YouTube is one way of combining both. In the authors' explorations of improved teaching strategies, the effectiveness of YouTube videos in a traditional class room setting was investigated, and it led to the following research question:

How can instructional YouTube videos be used in a class room to improve student's learning experiences?

Research methodology

The students enrolled for the advanced database course attend lectures once a week. During these two weeks, difficult database concepts were explained by the lecturer after which a video, created by the lecturers were shown to the students during class. This video was also uploaded to YouTube so that the students can view it again. Based on their experiences after the first two weeks of lectures, they were asked to complete an online questionnaire. The aim of the questionnaire was to determine if the students found the YouTube videos useful, and saw it as a way of enhancing their learning experiences. The study is not yet complete, as the students have not yet formally wrote the exam, therefore it is not yet known if their experiences led to better student results. A subsequent paper is planned where the results will be analysed, taking into account the role of the YouTube videos.

Teaching approach

The subject advanced databases forms part of a second year's degree at a large urban university in the administrative capital of South Africa. The university enrolls around 45 000 contact students in a wide range of subjects and is considered a research institution. Within the School of Technology, the Informatics Department offers a wide range of courses including the Introduction to Advanced Databases. Here the students are introduced to the advanced database concepts through attending both a two-hour theory lecture each week and four practical sessions spread throughout the semester, where they are then taught how to apply their theoretical knowledge in a practical environment. Difficult database concept were explained during a theoretical class setting after which they were shown a YouTube video which was designed and edited by one of the lecturer's husband, these videos were placed on YouTube and the link was provided to the students to go and view it in their own time as well. The reason they YouTube videos were selected as a platform to transfer data was because of the familiarity thereof from the student's side and the visual aid allows one to engage with the audience, especially the 21st Century student on their level (Jenkins and Dillon, 2013) and ideas, concepts can be clearly communicated through this medium. It is important to note that YouTube was not used to replace the pedagogy, but rather used to facilitate it and support the learning outcomes of this module and thus a blended teaching approach was followed, which means both face-to-face and online components were used for teaching purposes (Conrad and Donaldson, 2012).

The data concept that were explained will now be introduced after which videos will be explained.

Database concepts

In the second year advanced database course, a strong focus is placed on how to manage a transaction in a relational database. Two of the key definitions are consistency and concurrency. Consistency is defined as "indicating the permanence of a database's consistent state" (Coronel et al., 2013), or in layman's terms consistency has to ensure that all transactions either fully complete and is updated accordingly, or is not complete, and should not update any part of the transaction, but rather roll-back to the state of the database before the transaction was started. Concurrency or concurrency control is defined as "coordinating the simultaneous execution of transactions" (Coronel

et al., 2013). The concept is further explained to the student as a way of keeping the transactions in a database to ensure efficiency, by interweaving transactions and simulating the transactions to users as if they were the only users. In today's world, one normally deals with several users at any given time.

Another important aspect covered is database locking. Locking is defined as "guaranteeing unique access to a data item by a transaction" (Coronel et al., 2013). Students are then introduced to shared and exclusive locks, as well as pessimistic and optimistic locking strategies.

These concepts are generally explained more theoretically to students, and the lecturer can only really test understanding in a semester test environment. Videos were presented, and students were shown how the concepts are applied in a real-life database.

Two videos were made based on the material as discussed in the prescribed textbook, Database Principles: Fundamentals of Design, Implementation and Management by Coronel, Morris, Rob and Crockett. The videos were made by a database expert, and these videos were shown to students at the end of the two lectures. The two videos practically illustrate the theoretical aspects in a more practical way. The true value of the videos lie in the fact that it was relevant to what the students were taught in that lecture, as no other YouTube videos readily available could be used and be as effective in that environment.

The first video showed a transaction in a database where the consistency of a transaction was compromised, although the concurrency was kept intact. Figure 1 shows a screenshot of the first video. The second video explained to students how locking works, and what the consequences are of using an optimistic locking strategy. Figure 2 shows the screenshot of a warning given to a user if the optimistic locking strategy is used.
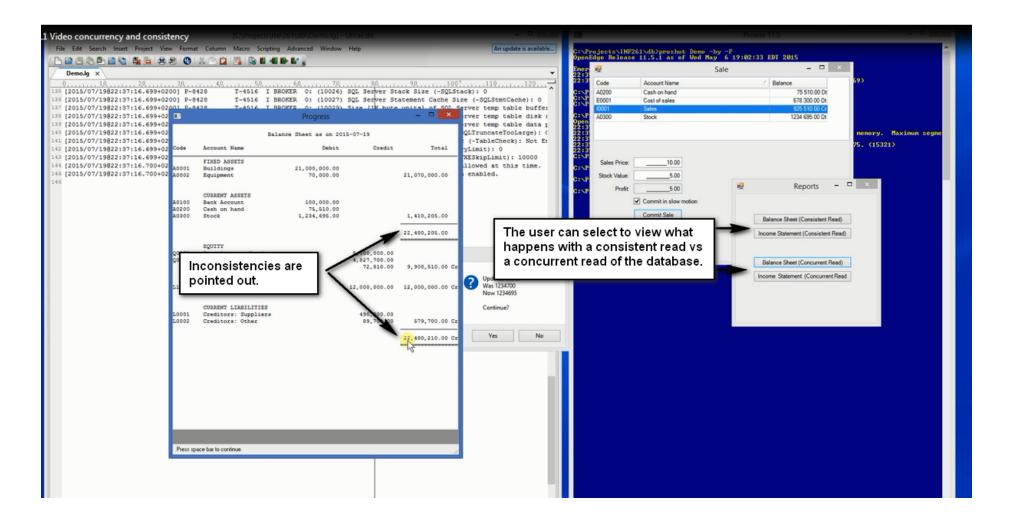
Figure 1. A screenshot from the first video, illustrating to students how a database will address concurrency vs. consistency in a given scenario.
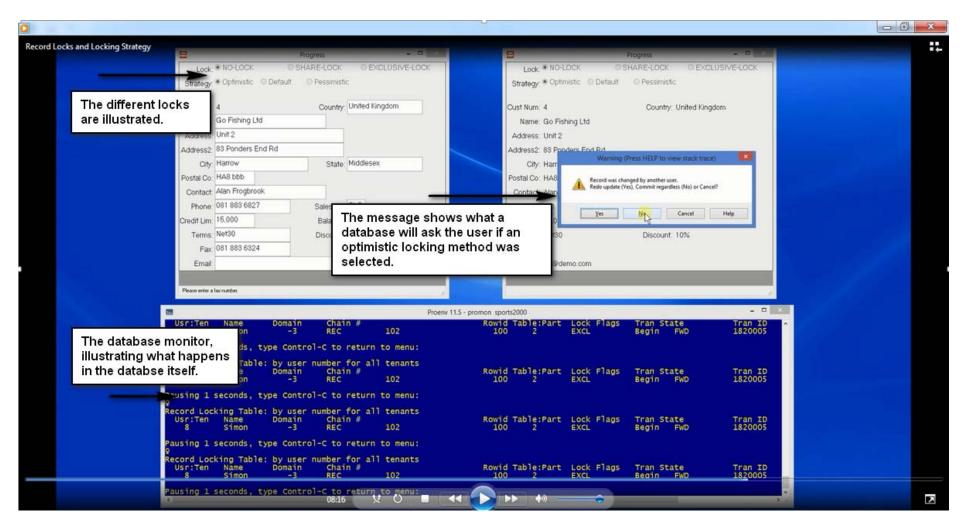
Figure 2. A screenshot from the second video, this time explaining how locking works in a multi-user database.

During their theory class, the YouTube videos were then shown in the last few minutes of the class.

After they saw the second video in class, they were asked to complete a questionnaire that was made available on the blackboard which the students are using for their studies on a daily basis. By using the blackboard tool, it allowed the researchers to ensure that the students responding to the questionnaire were indeed registered students for the subject Advanced Databases.

Results

A total number of 133 students were registered for the course of which 89 responded to the questionnaire, thus a 67% response rate. At this point one has to note that every student completing the questionnaire was then awarded an extra bonus mark at the end of the semester, however, this was completely, anonymous although the last question in the survey did ask that if they wanted the bonus mark, they had to provide their student numbers. During the analysis, directly after the data was downloaded from blackboard, this column was immediately deleted for analysis purposes.

To obtain a better understanding of the type of students this study focused on, some general information was obtained. These will first be discussed after which the results from using the YouTube video will be discussed.

The average age of the students in this class is 21 years old and they are studying a wide range of degrees, with the majority of students studying BCom Informatics.

Table 1. Degrees being studied

Degree	Number of respondents
BCom Informatics	46
BSc Geoinformatics	12
BSc IT	10
BIS Information Science	8
BSc Computer Science	7
BCom Statistics	2
BIT	2
B.Sc Natural Science	1
Bsc Geography	1

To determine the access students have to cell phones, computer and the internet the following data had to be obtained.

The students were then asked if they have cell phones and if so, if they can access the internet through their phone. One responded said that they do not have a cell phone and two did not answer the question, thus the assumption this paper is making is that they also did not have cell phones. Asking the remaining 85 if they can access the internet through their cell phone, 8, thus only 9% of the students said no.

Asking them if they have access to a computer at home and if so, what they primarily use this computer for, this was the results. Eighteen students, thus 20% of the students said they do not have access to a computer at home, three did not answer the question, and thus the assumption is that they do not have access, which means that in total 24% of the students to not have access to a home computer at all. Of the remaining 68, Figure shows what the students typically use their home computers for. It is interesting to note that there is an even split amongst the options provided for them to select. , with downloading notes and studying being the main reasons.
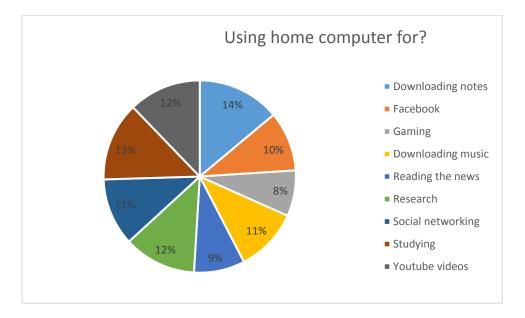

Figure 3. Using home computer for?

Acknowledging that even though all the students do not have computer a at home, all of them have access to the computers in the laboratory or in the library, and there is WiFi available on campus, they were then asked what they typically use the computers in the library or laboratories for, and they had to rank these from used the most, to the least.

Looking at what all of them ranked as their primary reason for using these computers, downloading notes, emerged on top with a majority of 72% respondents as can be seen from Figure 4. Looking at their second options as to why they use these computers, Figure 5 clearly show a wider spread amongst the activities. But it is still evident that they mostly use these resources for academic work.
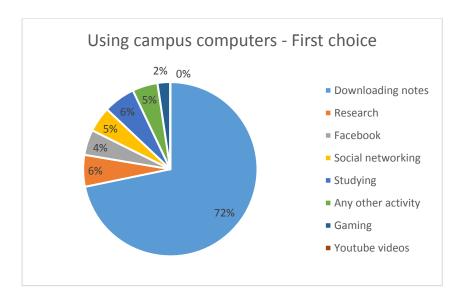
9

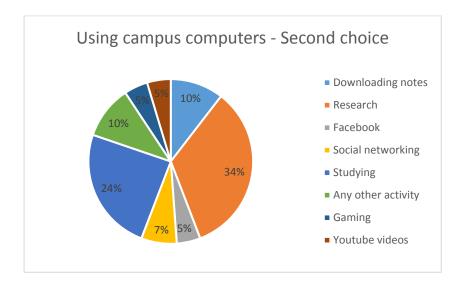*Figure 4. Using campus computer - First choice*

Figure 5. Using campus computers - second choice

They were then asked what other devices to they use, this was to determine if they have any other options of accessing the internet which in turn will have an effect on whether they will be able to watch the YouTube videos or not? This was a free text field and after cleaning up the data, the following emerged:

Table 2. Other devices being used

Device	Nr of Devices
Tablet	40
Laptop	23
Desktop PC	10
Kindle	2
Gaming (Xbox)	2
IPOD	4
None	7

From

Table 2, it is evident that a large portion of these students do in fact have tablets and laptops, which they can carry around and access free Wi-Fi on campus, and thus they should be able to access the YouTube videos from anywhere. However, this is not even halve of the class and this might in fact be a reason why they might not want to or even can access the video online. It is for this reason that the videos were also screened in class at the end of the relevant lecture, to make sure they had no excuse for not seeing the videos as least once.

Asking the students if they found the video tutorials to explain difficult concept, five of them did not answer this question, it is not clear why. However, the results from the remaining 84 students can be seen in Figure
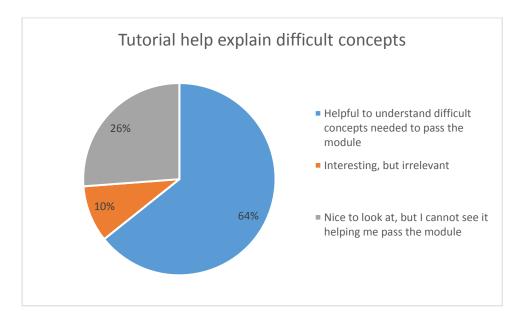

Figure 6. Tutorial helpful

The length of the videos were approximately 15 minutes and 10 minutes respectively. It was important to determine if this was an acceptable length for the students, 36 said it was just long enough for me not to get bored, and 48 said that it was too long. Thus the majority of the students said it was too long and thus this could be improved on for any new videos that will be made for this subject.

Asking them about the voice quality of the videos in class, 47 said difficult to hear at some point, 14 said it was unclear and 23 said it was very clear. This is a problem as the concepts are being discussed, and if they students can hear, then the whole idea of teaching difficult concepts to students fly out the window. It does seem as if the sound was soft in the classes but if you watch it on your own device, the sound is much better. Thus one had to determine how the students accessed the videos outside of the classroom, however what emerged is that 17 of the students only saw the video in class, thus they don't have access to it outside of the classroom. This could be alarming, although one has to keep in mind, that all the students do have access to computers in the library and laboratories, and thus they do have access, it is a matter of going to the library or laboratories and watching the videos there. 45 said they access the

videos through their computers, and 19 said they use both their computers and their cell phones to access the data, three said they use their cell phones only.

Asking them how they experienced watching the videos in class, 45 said that it was difficult to follow and thus they prefer watching it on YouTube, 25 said that Wastes time in class and that they can always watch it in my own time. Whether they will watch it that is the question. Only 14 said it forced them to watch the video as they will not watch it on YouTube.

It was interesting to see why students will access any YouTube content in general, and whether they do use it for any guidance or explanations. This part of the study was the most insightful, as it emerged that 77 of the respondents said they either use YouTube for if they need to understand a concept or if they need a step-by-step guide of making/performing difficult tasks. Only five said they only use YouTube for pleasure. This results is a clear indication of the need for proper insightful content to be placed on YouTube and to make sure that our material are available to our students otherwise, they will just go and look at any YouTube video which might not have the right content in and which might confuse them even more.

The research question proposed in the beginning of this paper, how can instructional YouTube videos be used in a class room to improve student's learning experiences, was addressed by introducing the videos to the class environment, allowing the students to view the videos and asking immediate questions to the lecturers if they had any. By adding the videos to YouTube also allowed the students to review the content again in their own time to make sure that they understood the concepts. They could also view the videos repeatedly over a long period of time which ensure that they repeat the content, which is a vital part of the learning process.

Limitations to the study
 The study is not yet finalized. The study will take the final exam results into account when the follow-up paper is written. The course is ongoing , and exam results will only be available at the end of the academic year in December 2015. A lack of student results forced the researchers to base the paper more on student perceptions, rather than on results.

Conclusion
As mentioned earlier, by engaging these students through social media activities we are equipping these students for their future workplaces as even the workplaces are starting to focus more on the use of social media for their daily operations (Ferris and Wilder, 2013). It is our responsibility as lecturers to produce such students. YouTube videos as a teaching tool gives a summary of important aspects of a lecture, enables students to access the videos anywhere 24/7, and learn from a step-by-step approach. This study explored the use of YouTube videos when explaining abstract concepts. A diverse group of

students mostly agreed that the videos were useful, did assist in grasping difficult concepts and would help in finally achieving a good grade at the end of the semester.

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