

Exploring Grade 11–12 Teachers’ Use of Instructional Videos in Natural Science Subjects at Ponghofi Secondary School

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ABSTRACT : This study explored Grade 11-12 teachers’ use of instructional videos in Natural Science subjects at Ponghofi Secondary School in Namibia. To explore the attitudes, perceptions and experiences of teachers’ use of instructional videos, 8 semi-structured interviews (pre and post) were conducted. The pre-semi structured interviews were about the teachers’ attitudes, perceptions and experiences and were held with individual teachers before the teaching intervention using instructional videos. After the intervention, the post semi-structured interviews were conducted with the same individual teachers to assess their attitudes, perceptions and experiences after the use of instructional videos. The findings revealed that most of the teachers perceive instructional videos as powerful tools to teach Natural Science subjects and good for the learners’ subject mastery. The results further showed that most of the teachers lack self-confidence and have a high level of technophobia. It also emerged that there are a lot of barriers that affect teachers’ ability to use instructional videos such as technology resources, technology support, knowledge and skills and these barriers negatively affect the use of technology in schools and prevent teachers from becoming frequent technology-users. Finally, the findings revealed that, most of the teachers use free downloadable videos from various websites such as Eureka, Make Me Genius, Smart Learning for All and YouTube. The study concluded that teachers should adopt the culture of using instructional videos in their lessons to make their lessons informative, interesting, and resourceful and enhance understanding, and knowledge retention.

KEYWORDS - instructional videos, technology resources, technology support, technophobia, Eureka, Make Me Genius, Smart Learning for All, YouTube, ICT, World Wide Web, internet research.

I. INTRODUCTION

Instructional videos serve as an important instructional tool in classrooms in which teachers have convenient access to adequately present rich lessons and have some freedom of expressing the curriculum contents in a way that learners can understand holistically (Becker, 2000). The frequent use of technology in the classroom can make teachers to have positive personal beliefs and attitudes toward using technology as a tool to enhance teaching and learning.

Although the Ministry of Education, Arts and Culture’s Information, communication and technology (ICT) policy for education gave freedom for the use of technology in classrooms, it is harder to measure if the government is

committed to support education authorities to fully implement technology in all Namibian schools. The purpose of our research article is to explore the teachers' attitudes, perceptions, beliefs and experience towards the use of instructional videos in teaching Natural Science subjects at secondary school level in Namibia. While previous researchers have documented the influence of teachers' pedagogical beliefs on classroom practices related to teaching mathematics (Vacc & Bright, 1999), science (Czerniak & Lumpe, 1996), history (Wilson & Wineburg, 1988), and literacy (Fang, 1996), only few examined how teachers' attitudes, perceptions, beliefs and preparedness influence adoption and use of instructional video in classrooms.

Research question

In line with the purpose of the study, answers to the following primary question were sought:

What are the attitudes of Grade 11-12 Natural Science teachers towards the use of instructional video as a teaching and learning tool at Ponghofi Senior Secondary school?

Research objective

The objective for the study was:

To explore the attitudes of Grade 11-12 Natural Science teachers towards the use of instructional video as a teaching and learning tool at Ponghofi Senior Secondary school.

II. LITERATURE REVIEW

Many reports in the global north (Czerniak & Lumpe, 1996; Ertmer, 2005; Fang, 2006; Ottenbreit-Leftwich, Glazewski, Newby & Ertmer, 2010) reveal that teachers who have access to technology and internet connectivity in classrooms, their learners enjoy an average learner-computer ratio of 4:1, with 98% of schools and 77% of classrooms connected to the Internet. Even though, a number of recent reports suggest that this is starting to change in the global south, the use of technology in classrooms and internet connectivity in schools in Namibia is very low compared to schools in the global north.

The low internet connectivity and use of instructional technology in classroom is influencing the teachers' beliefs, attitudes and perceptions towards the use of technology. The above statement is supported by Ertmer (2005) who believes that teachers' beliefs are influencing teaching practice than the subject content knowledge. Moreover, Ertmer (2005) argues that professional decisions that Natural Science teachers make are based on their beliefs. Their beliefs cause them to have assumptions towards the use of technology; learners' abilities; classrooms; instructional materials and even their own abilities. The assumptions can be influenced by various conditions such as lack of time, resources, lack of self-confidence, school culture and teacher's level of using technology. Ertmer (2005) has not only stated assumptions that lead to unwillingness to use instructional video but perceived technophobia as one of problems that prevent teachers not to integrate instructional videos in their teaching.

Apart from looking into the attitudes and beliefs of Natural Science teachers, there are certain barriers that Hew and Brush (2007) believe that can affect the use of instructional videos in classroom, namely: technology resources, institution, subject culture, knowledge and skill as well as assessment. One of the primary aims of our study was to establish which barriers are affecting the teachers' use of instructional videos at a Namibian school. Although there is a significant number of a related study conducted especially in the global south as mentioned above, none of the studies explored the teachers' attitudes towards the use of instructional video as a teaching and learning tool in the Namibian context.

We agree with Blaschke (2014) who argued that instructional video use is playing important roles in teaching and learning experiences, but still there are teachers who have negative attitudes towards/regarding? they use instructional videos in classrooms as tools for teaching and learning to maximize academic performance particularly in Natural Science subjects at secondary school level. One of the pieces of evidence in the context of Namibia is the National Senior Secondary Ordinary level examination results 2014, showed that only 6.8% managed to get 60% and above in Biology while in 2015, only 13.6% managed to get 60% and above in Biology in National Senior Secondary Certificate Ordinary examination at Ponghofi Secondary School in the Ohangwena Region (Ministry of Education, 2014; Ministry of Education, Arts and Culture, 2015). Based on the results of learners' performance in Natural Science subjects in those years (2014 and 2015), performance tends to be low. The low performance does not mean that all teachers rarely use or do not know the existence of Information Communication Technology tools to enhance learning in the region. The problem could be associated with teachers' attitudes, beliefs and perceptions toward the use of instructional videos to enrich teaching and learning.

III. METHODS

Research design

Our study employed qualitative methods whereby two semi-structured interviews (pre and post) were conducted with 8 Natural Science Teachers at Ponghofi Secondary School. The pre-semi structured interviews were conducted to examine teachers' beliefs, attitudes and perception towards the use of instructional video in Natural Science subjects to enhance learning. Eight (8) lessons whereby each of the selected teachers used instructional videos were organised. The post-lesson semi structured interviews were conducted with the same teachers to examine their beliefs, attitudes, perceptions and experiences after they taught lessons using instructional videos. All the interviews were audio-taped.

Sample and Sampling

The basic mixed methods sampling strategies were used to identify the school, 8 Natural Science teachers who used technology in teaching and learning regularly and 2 Grade 11-12 classes that were exposed to the use of instructional videos. Purposive and simple random sampling strategies are designed to provide a sample that will answer the research questions under investigation, (Teddlie & Yu, 2007).

The researchers purposively selected five secondary schools that use instructional videos out of twelve secondary schools in the Ohangwena Region. A simple random sampling was used to select one school among the five schools. Researchers wrote the names of the five schools on pieces of paper, folded the pieces of paper, put them in a box, mixed them and picked one piece of paper with Ponghofi Secondary School name randomly.

Data analysis

Descriptive field notes (audio tape) and semi-structured interviews were reviewed and transcribed. We coded data using ATLAS-ti software, and used an inductive analysis of qualitative data where the main purpose was to allow themes to emerge from constant comparison. Each interview was constantly compared with other interviews to see if there are themes emerging until all themes were exhausted.

IV. FINDINGS

The following themes emerged from our study findings:

Instructional Video Importance

Based on the teachers' views on why they use or do not use instructional technology, teachers believe that videos can visualise and explain concepts that learners can easily have misunderstood or have so many misconceptions. They further revealed that, using instructional videos especially the animated ones can help learners understand the concepts easily and clarify on misconceptions since videos show more details of the microscopic processes and abstract concepts visually. Again, they also realized that the usage of animated instructional videos can make learners to love the natural science subjects.

Teachers' Perspectives on how Instructional Videos should be used.

According to the teachers the right time to show the video during the lesson is the most important approach. They suggested that teaching first and then show the video to the learners is appropriate because it helps the learners to make connections between what they were taught theoretically and what they see in the video. They gave an example of teaching about dialysis machine (kidney machine): *"if you show the video without telling them what kidney machine is and how does it work, when they see it in a video, they may not make connections"* narrated one male teacher. Apart from showing videos at the end of the topic, teachers said the shorter videos are ideal compared to the longer ones that make learners to lose concentration and interest in watching. Another concern was that the language used in most of the instructional videos is difficult to be understood by learners.

Frequently use of instructional videos in classroom as supporting materials to enhance learning.

Based on the views of the interviewed teachers, the instructional videos need to be used more often, so that learners can learn meaningful rich and meaningful contents. Some teachers have indicated that in some videos there is additional contents that help learners to expand and have broad subject knowledge. The teachers who use instructional videos take them from the internet in support of the internet connectivity at their school. According to him, he tries to get a video on each specific topic he teaches, but it is not easy to get a video with precise content that he needs.

Types of Instructional Videos Teachers Use

As teachers said, animated videos are engaging and visualizing. They gave examples on the good part of using the animated instructional videos. Their claim support Betrancourt (2005) who argued that animated videos can be used to visualize phenomena that are abstract, microscopic and not spontaneously perceived the right way.

Sources of Instructional Videos

Sharing their experiences, the teachers stated that they use various websites such as Eureka, Make Me Genius, Smart Learning and YouTube. They do that by typing in the topic in the World Wide Web (www) and the related videos appear and then you can now choose the video that is appropriate or suit their taste. Some said they borrow videos that can play offline from colleagues, while some said they use clip converter downloading tool to download videos and keep them for future use.

Reasons for using Instructional Videos from YouTube, Make Me Genius, Smart Learning and Eureka

As it emerged from the interviews conducted with the Natural Science teachers, the sites they use to obtain instructional videos from are more accessible to them, free of charge and find videos with precise information they need to teach and good for learners to learn. The websites such as *YouTube* where you

can find the online instructional videos are accessible to the learners and there are various video contents on numerous topics (Mitra, Lewin-Jones, Barrett & Williamson, 2010).

Strategies Teachers use to engage learners in Instructional Video

The respondents indicated that bringing a video to the classroom is one of the strategies which is regarded as a success. They tried to give learners links to search for the videos for themselves, but it disadvantaged some of the learners who do not have access to computers and internet connectivity at home. It emerged from the responses that the data projector is suitable when the class is big. A laptop alone has a small screen and not all the learners are able to see. However, when the projector is used, it projects the big screen on the wall and all the learners can see very well.

They further expressed appreciation toward Ohangwena Regional Library that was working together with a Germany Program to help learners who are doing Biology and Geography at Higher Level through videos at the library. Unfortunately, the program ended due to lack of funding. They expressed that they wish the program could continue or come back because it helped learners that took part.

The strategy that the teachers use to access the instructional video is good and is in line with the findings of De Boer, Kommers and De Brock (2011) that the web has created a much more autonomous and flexible educational video materials for learning purposes that can be downloaded or played online by giving learners links to access them, but the teacher is the right person to choose a video to be used in classroom.

The barriers that affect the use of technology in the classroom.

Our study findings revealed the following barriers:

Technology resources (time, money, access)

The teachers expressed how technology resources barriers affect technology usage. They strongly argued that money is one of the problematic barriers to accessing technology in the schools and it affects the use of the instructional video in school very much because so far, they only have one data projector for the whole school.

Knowledge and skills with regards to technology use (teachers and learners)

The participants indicated that teachers and learners have limited skills and knowledge in terms of technology usage. Some have skills and knowledge to use technology, but only low-level skills such as word processing, Internet research, and playing video and only very few have higher-level skills such as spreadsheets, presentation software, learning tools and digital imaging. They gave a scenario of an online video stopped playing or ads interfering the video play, the only thing they could do is to stop and suspend the class.

Attitudes and beliefs with regards to instructional video use (your own and others)

Some interviewees revealed that most of the teachers at school have positive attitudes towards the use of instructional videos. They remarked that learners learn very well when using technology (instructional videos) because instructional videos help them to learn and understand concepts. Still there are other teachers who believe that videos make teachers lazy because a video does what the teacher is supposed to do in the classroom. Some teachers believe that instructional technology use is a waste of time for teaching because they think the learners perceive instructional videos as recreational movies for entertainment. These particular teachers' beliefs and perceptions concur with Mitra, Lewin-Jones, Barrett and Williamson (2010) argue that teachers who hold a negative view on the use of instructional videos often see videos purely as entertainment rather than learning media.

Assessment (including national standardized tests and examinations)

The teachers emphasized that when choosing a video, one must consider choosing a video that meets the learning objectives and basic competencies of the syllabus. If you fail to choose relevant videos, learners lose interest and are at risk of failing examinations. What is said by the teachers is in line with the research findings of Ibrahim, Antonenko, Greenwood and Wheeler (2012) that learners not only prefer instructional video over text but are also more likely to gain a deeper conceptual understanding of the content from the video than from words alone and these increases learning outcomes.

Subject culture (like Biology teachers often say that their colleagues don't need to use technology, they only use science laboratory instead)

The teachers clarified that at their school they do not have a culture that prevents the usage of instructional videos in some subjects. They believe that there are some parts in Biology or Geography that need to be experimented in lab and then there are some parts that you do not need to go to the lab or perhaps.

Technology Support (training, technical issues, selection of right videos)

According to the interviewees, the Ministry of Education, Arts and Culture does not give support on the use of instructional videos, but they get little assistance from their fellow computer studies/ICT teachers at school particularly on the correct integration strategies of videos into their classrooms. They suspect that the Ministry does not know if there are some teachers who use instructional videos at schools, that's why maybe they only concentrate on training Computer Studies and ICT teachers in technical issues. They said that there is no provision of prescribed instructional videos in Digital Versatile Disc (DVD) or approved WWW where that they can use when teaching. However, the Ministry of Education Arts and Culture give computers to schools in rare cases. As per the Ministry of Basic Education, Sport and Culture and Ministry of Higher Education, Training and Employment Creation (2005) teachers should receive the support (including trainings) that they may need to integrate technology in their teaching.

Impact of Barriers on Teachers' uses of Technology at Secondary School

The teachers narrate those technological resources barrier has more impact and limits the usage of technology at school.

Technology Resources at School to Encourage Teachers to Use Instructional Videos

The teachers believe that if the school had enough resources most of the teachers could feel motivated to use instructional videos in their classrooms. Most teachers demand from the school authorities to buy more data projectors for the school. If the school lacks resources such as funds, facilities and infrastructures then it will be difficult to incorporate technology in teaching and learning (Hew & Brush, 2007).

Internal and External Factors that motivate Teachers to use Technology in Class

When one teacher was asked to mention about what motivates him to use instructional videos more often, he said: "What I have observed is that when I use technology, the learners become more interested in the lesson and the whole atmosphere in the class changes. When you are using technology, you will not have learners sleeping in the class. On top of that, technology stimulates learners to learn more". The use of instructional videos by teachers is influenced by their own beliefs and attitudes towards the use of technology (Ertmer, 2005). If a teacher believes that technology does not enhance learning, then he or she will not be willing to use technology.

Teachers' Perceptions on the use of Instructional Video in Five Years to come.

The teachers perceived that usage of instructional videos in five years to come will be higher, because most of the teachers realized the importance of using the instructional videos. If most of the teachers start to use technology in schools, more learners are also likely to be willing to use technology for learning. Teachers are the key agents in respect to educational change and innovation. Therefore, a basis for any new strategy should start with a teacher. Again, if each teacher gets trained in the use of ICT (especially instructional videos), they could share that knowledge with a large number of learners they teach on annually basis (Magambo, 2007).

Suggestions on Instructional Video Usage

Based on the interview, the teachers proposed that teachers must monitor learners closely when they are watching videos on their own in class to avoid learners diverting from watching the videos that are important for learning. One teacher further proposed that instructional videos should be shorter so that learners will not lose interest and concentration. O'Hagan (2001) as cited in Mitra, Lewin-Jones, Barrett and Williamson (2010) suggested that videos should be used in short segments to maximize learner concentration.

Post-semi-Structured Interview analysis with Biology teachers

The same teachers were interviewed after teaching lessons using instructional video to explore their experiences, attitudes and perceptions with regards to the use of instructional videos. The following section narrates the interview responses:

Effectiveness of instructional video to communicate what the learners were supposed to learn.

The teachers expressed that the watched video was prepared in a way that it covered the basic competencies of the syllabus. The information in the video is exactly what learners needed to learn about the topic (Sexual Reproduction in Flowering Plants). Some teachers were impressed that different explaining strategies used in the video simplify the contents for the learners:

"I felt that much learning took place than all the other groups, it was much more learner-centered, and the learners had control of the whole activity"

Difficulties experienced in any of the lessons and how they overcome them.

The teachers explained that it was difficult to measure if learning has taken place now. They indicated that learners could think of other things while they watch a continuous video for a longer period.

" They sit and listen continuously to something for ten minutes and more, minds become diverted sometimes and you know if there was a teacher who would stop them and give some things it could has been better, but I would say it was kind of a challenge maybe to learn, because you cannot measure without learning take place".

This supports the argument of Jhurree (2005) that, if ICT is properly integrated in classroom, it has the potential to enhance the teaching and learning process effectively.

Learners' engagement in the Lesson

The teachers revealed that learners were not engaged since the teacher was just playing all the roles in the lesson. They suggested that teachers need to find ways of engaging learners in lessons where

instructional videos are being used as learning and teaching tools. Supporting what the teachers have suggested, Dickey (2005) claims that completing challenging tasks that are typically complex and are sustained over a period of time can help the learners to be more engaged during the lesson.

Perceptions of Teachers on instructional videos use to enhance learning.

Teachers perceived instructional video as a way of making lessons rich and informative to the learners. They indicated that instructional video could help to minimize misunderstandings and misconceptions among the learners:

“If there were some learners who might not get all the information when the teacher was presenting the lesson without a video, perhaps they misunderstood something; there is still an opportunity to learn it during the video”, remarked one teacher.

In defense of this teacher’s view, Höffler and Leutner (2007) and Mayer (2005) narrated that instructional video overcomes the negative learning outcome caused by the extraneous cognitive load that occurs when information is presented without visual teaching material. Visual teaching aids such as instructional videos allow the working memory to yield extra time for cognitive processes of selecting, organizing and integrating information (Moreno, 2007).

Teachers’ Learnt Experience from the Study

The teachers claimed that shorter instructional video use is a better way of using instructional videos interactively because when a video plays for a short period of time learners can’t lose interest or get bored. Besides what is said by the teachers, Sang, Valcke, van Braak, and Tondeur, (2010) revealed that instructional videos boost learners’ interest in learning science. Additionally, technology usage improves students’ understanding of the nature of science and the way scientific knowledge is constructed (Kasanda, Lubben, Gauseb, Kandjeo-Marenga, Kapenda & Campbell, 2005).

Teachers Comfortability and Confidence during the Lessons

Some teachers clearly stated that they were not confident enough when presenting the lessons.

“I was not used to the use of a video at a certain point and do some emphasis and I had those nervous feelings, you know when somebody is visiting you during class there is always that feeling”

We suggest that teachers need to improve their self-confidence by working with knowledgeable peers and participating in professional learning communities (Ertmer, Ottenbreit-Leftwich, Glazewski & Newby, 2010) to facilitate learning in their classroom.

Additional Suggestions Regarding Instructional Video as Strategy

The teachers emphasized that instructional video is a good tool that teachers need to integrate in classroom routines. They suggested that teachers should integrate instructional videos in their classrooms in a learner-centered way to give learners a chance to learn and explore on their own. We agree with the teachers that learner-centered learning promotes discipline, classroom dynamics and self-directed learning among the learners (Rüütman & Kipper, 2011).

V. DISCUSSION

Our study has found out that many Namibian teachers use technology for numerous low-level tasks (word processing, Internet research) while, the higher-level tasks (spreadsheets, presentation software, learning tools and digital imaging) are still very much in the minority to enhance their lessons. Most teachers reported that they do not know how to get information from the Web and send e-mail, only a small proportion of the teachers are able to do so.

Our study reveals that still it is important to remember that it is not necessary to change teachers' attitudes and beliefs before preparing them for various educational technology applications. A more effective approach might be to support teachers' most immediate needs (Ertmer, 2001). Motivation is the key to increase teachers' confidence for using technology so that over time, higher level uses become more plausible. Still, this has not yet been endured in the Namibian research house. It will be important to revisit, in the future, those teachers who are currently reporting a variety of low-level uses and find ways of motivating them to have high-level uses.

It is found out that teachers' lack self-confidence and reasonable level of technophobia in using instructional video play an important role when making decisions to use or not to use instructional video. Teachers with low self-confidence, higher level of technophobia and assumptions towards the use of technology are unwilling to use instructional videos in their classrooms (Ertmer, 2005).

The study further shows that, there are a lot of barriers that affect teachers' ability to use instructional videos. Barriers, such as technology resources, technology support, knowledge and skills can negatively affect the use of technology in schools and prevent teachers from becoming frequent technology-users. Additional barriers such as teachers' negative attitudes towards the usage of technology are influenced by other barriers such as technology resources, technology support and so on (Hew & Brush, 2007).

The current study reveals that teachers perceive instructional video as a powerful tool to enhance learning. We, therefore, suggested that the appropriate time to use instructional videos either segmented or not is after presenting the topic. Showing instructional video deductively helps the learners to make connections between what they were taught theoretically and what they have seen in the video.

VI. CONCLUSION

In conclusion, we argue that teachers are mainly using videos from various websites such as *Eureka*, *Make Me Genius*, *Smart Learning for All* and *YouTube* as they have free videos with various contents on numerous topics and are easily accessible. They find videos from those websites with precise information they need to teach and good for learners to learn. Teachers play the instructional videos online or download them so that they can use them when there is no internet connectivity.

Lastly, we posit that teachers should adopt the culture of using instructional video in their lessons that are accessible and free websites, such as *Eureka*, *Make Me Genius*, *Smart Learning for All* and *YouTube* and so on, to make their lessons informative, interesting, and resourceful and enhance learning with retention.

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