A PRELIMINARY STUDY OF PODCASTING IN DEVELOPING HIGHER EDUCATION INSTITUTION: A SOUTH AFRICAN CASE

Abstract

Purpose - The goal of our work is to report on Podcasting experience by faculty and students in a South African Higher Education Institutions, identify issues, limitations and discuss implications for the design of future tools.

Design/methodology/approach - This work consisted of two parts: semi-structured interviews with lecturers, content/curriculum developers and a student survey.

Findings - Rogers' diffusion of innovations theory provided the framework for this research including determining how new innovations are disseminated, their rate of adoption, the five stage decision making process for adoption and the characteristics an innovation must possess to be attractive to adopters. The methodology used relied heavily on descriptive and qualitative data analyses in order to determine the current podcasting practices and experiences. Results reveal that by assuming some of the respondents are "Innovators" or "early adopters", they are still in the early stages of the decision making process.

Research limitations/implications - Some instructors who are identified as "early adopters" are experimenting with Podcasting as an add-on to existing lecture resources. However, innovations and their subsequent adoption require an understanding of lecturers' and students' perceptions, opportunities and challenges.

Originality/value - Podcasting in developing HEIs and the tools therein to support the process has not been given much attention. The context of this study is the first kind of empirical research in this area. The findings from this exploratory research will be valuable for podcasting users.

Keywords: Podcasting, Developing HEIs, Perceptions, Podcasting tools, mobile education, contextual tools

Paper Type: Research Paper

1. Introduction

The delivery and instruction of lecture content in higher education (HE) has been enhanced by technology developments. This millennium has witnessed increased interest in experimenting with mobile learning and the use of Web 2.0 technologies i.e. podcasting– each promising improvements in delivery, participation, knowledge acquisition and retention (Jenkins, Goel, & Morrell, 2008). In addition, the advent of the Internet has presented new ways for academics to create, share and distribute educational content (Ractham & Zhang, 2006; Shim, Shropshire, Park, Harris, & Campbell, 2007). The works reported in (Evans, 2008); Shim, Shropshire, Park, Harris, & Campbell, 2007; Jowitt, 2008; Edirisingha et al., 2007) reveal that podcasting emerged from a combination of the terms 'broadcasting' and 'iPod'.

It involves authoring and publishing audio and/or video (vodcast) files using really simple syndication (RSS). There are a number of trends that have led to increased attention to podcasting by educators, practitioners and other technologists i.e. media houses such as the British Broadcasting Corporation (BBC), Times online and Cable News Network (CNN) have increasingly made available podcasts of selected programmes (i.e. sports, drama, etc.); increases in mobile device ownership and increased availability of podcasting tools.

However, creating content for informal exchange and entertainment is different from that for academic learning. There exists some research on the use and evaluation of podcasts but it has focused on the universities in the United States of America (USA), the United Kingdom (UK) and Asia Pacific. Moreover, podcasting has been explored in the following areas: business and education (Asia Pacific), to support a university news service, coverage of guest lectures and dyslexia support (UK) and to augment classroom support (USA) (Shim, Shropshire, Park, Harris, & Campbell, 2007).

There is limited published work to evaluate the podcasting of educational lectures in developing regions such as South Africa. Furthermore, the available tools are designed for use in developed world contexts. Therefore, if podcasting is to be successfully used, there is a need for contextual tools for use within developing regions. We therefore present results on the use of podcasting technology at a South African HEI by different stakeholders (i.e. academics and students). In order to understand current usage, perceptions and limitations of Podcasting, we undertake a concurrent mixed methods study involving both qualitative and quantitative data collection and analysis. The rest of this paper is organized as follows; section 2 reviews literature on podcasting lectures in HEIs, the next section details the methodology used for our studies and data analysis. Section four details a summary of results, five presents implications followed by conclusions in six.

2. Overview of SA HEI situation

This sub-section is based on the report on Landscaping Information and Communication Technologies in Higher Education in South Africa prepared for TENET (Brown et al. 2007). In the past, there was not much connection between provision of ICTs and HEI reform process in Africa. ICTs were often isolated and regarded as extras by many science oriented departments i.e. Computer Science, Engineering or technologically biased faculty. In their status reports on Information and Communication Technology (ICT) and Higher Education (HE) in African countries, Ngugi et al. (2007) and Farrell and Isaacs (2007) reveal that many African governments identified ICTs as a national development priority over the last decade or so. In particular, South Africa has certainly moved forward in terms of ICT access since 2000 when compared to the rest of SSA. South Africa has more fixed lines, Internet users (including broadband subscribers) and mobile subscribers - This has increased from 29.7 subscribers per 100 people in 2002 to 92.6 per 100 people in 2009 (ITU, 2009). Similarly, a review of current research certainly demonstrates that ICTs are being taken seriously in teaching and learning in South African HEIs.

Despite these developments, developing HEIs have remained very much behind those of other regions such as the Americas, Europe and the Pacific's in embracing sector reforms and ICTs. In fact, even in South Africa alone, progress on the adoption of ICTs has remained uneven with the majority of HEIs adopting a piece-meal add-on approach. Although, there has been some progress, the effectiveness of ICT usage in many HEIs has proved very complex. In their study of ICTs and HE in the Western Cape (South Africa), Brown et al. (2007) reveal the following as barriers to implementing e-learning technologies:

- Lecturers were constrained in their use of ICTs for teaching through lack of adequate on-campus facilities and poor institutional and collegial support for e-learning.
- Lack of local technological capacity to sustain use of ICTs;
- Technical problems associated with using ICTs for teaching/learning
- Lack of capacity/skills on the part of academic staff for instance one of our respondents in this study considers themselves *competent in using computers, is very interested in educational technology but is not technically expert and understands the use of it but cannot do the stuff and relies on the Center for Educational Technology*
- Lack of infrastructure off- campus for instance one of our respondents said the following: *there is a whole question about your accessibility and what your resources are. If you are doing it remote not from say a campus like this, what is the interface, the bandwidth, what is your computer….umh…..I mean is there an issue with what you have got and what we have got and if we load it in this format can you access it and I think that is where there is a problem.*
- Technology needs to be incorporated into university education, or it will lose its credibility;
- Lack of infrastructure on campus (e.g. problems with access; bandwidth; power supplies; maintaining phone connections; etc.)

In addition, an overview of literature describes an extremely diverse range of practices occurring with regard to e-learning in the SA HE sector (Moll, Adam, Backhouse and Mhlanga, 2007). Implementations of LMSs have varying levels of sophistication and reports were received of some institutions with a complete absence of technology for learning. This demonstrates that there is no common approach to e-learning across South African HEIs.

2.1 E-Learning software used

Blackboard and WebCT (either Vista 4 or Campus Edition 6) were the only commercial LMSs used by HEIs in South Africa. In a survey with E-learning managers, they indicated that LMSs that are built upon open source technology such as Moodle, KEWL or custom - made systems based on SAKAI. Some institutions are in the process of migrating towards open source environments. Other e-learning software tools used in addition to LMSs are identified as categorized below:

- Html creation tools (e.g. CourseGenie en DreamWeaver)

- Assessment generating interfaces (e.g. Respondus, Umfundi Assessment System, TestTool)
- File reduction tools (e.g. Impactica)
- Plagiarism detection tools (Turnitin and Dropbox)
- Research support software (e.g. Nvivo and RefWorks)
- Podcasting and other mobile learning are being investigated and piloted by a few institutions.

2.2 Related Work on Podcasting

Literature on podcasting is currently mostly practice based and anecdotal. The majority covers "How to" create podcasts and technical requirements, others describe perceptions of use. For instance work presented by Ketterl et al. (2006) describe the use of VirtPresenter - a PowerPoint based lecture recording system currently integrated into Stud.IP - a Learning Management System to create a web enabled presentation for further adaptation to mobile devices while Gannod et al. (2008) use Profcast for capturing Microsoft Power Point and Apple Keynote presentations with voiceovers; Snapz for capturing full motion presentations of software use (e.g. a screen cast); iMovie for capturing full motion talking head lectures; iWeb for deploying the podcasts onto a standard web server and Black Board for storage, grade book and assessment management. Other such works include those by; Copley, 2007; Brown et al., 2008; Chandra, 2007; Rech (2007), Larraga et al. (2007), Rugg (2009) and Meinel et al. (2007). Many of the applications use software such as iMovie, iWeb and Garage band normally shipped with Apple computers which in most cases are expensive and therefore limited in ownership by lecturers and students in the developing world.

Other works present perceptions on usage of podcasts for instance Shim and Shropshire (2007) provide an overview of podcasting and webcasting, and examine student perceptions, preferences and receptiveness between the different delivery richness of communication media in the USA, Jowitt (2008) presents perceptions and usage of library instructional podcasts by staff and students at New Zealand's Universal College of Learning, Ractham and Zhang (2006) provide a technological overview of podcasting, and examine the potential of podcasting usage within educational settings, podcasting academia, and suggest future directions for podcasting in the USA.

Despite the reported successes for many of the tools presented, there is a gap in the literature on the usage and perceptions of podcasting for developing HEIs. Mugwanya & Marsden (2010) further reveal that the majority of tools published for authoring mobile educational content report on their use in developed HEIs. These tools may not be easily adapted to developing HEIs due to the varying social, economic and cultural environments. This is evident from the low adoption of some e-learning tools such as Blackboard and WebCT in various African HEIs. Moreover, Podcasting is not yet widespread in SA HEIs we explore its use at UCT and seek to answer the following questions:

a. What are the current podcasting practices and experiences considering the existing infrastructure constraints?

b. What are the current limitations and perceptions of Podcast usage?

c. How can we identify opportunities for future technology enhancements?

2.1 Theoretical Framework

In order to understand adoption of Podcasting at UCT, we use Rogers' (2003) diffusion of innovations theory reproduced in Jowitt (2008). As Rogers (2003, p. 5) points out, Diffusion of innovations research describes the *"process by which an innovation is communicated through certain channels over time among the members of a social system"*. Rogers (2003) outlines five groups of adopters' i.e.

(1) Innovators

(2) early adopters

(3) early majority

(4) late majority and

(5) laggards

The argument is that that once the innovators and early adopters accept the innovation, the rate of adoption increases following an "S" shaped curve until it hits a plateau. In addition, they go through a five stage decision making process i.e. knowledge of a new innovation, persuasion and opinion formation of the innovation, decision to adopt/reject, implementation and use of innovation and confirmation of the innovation. Furthermore, in order for a technology to be attractive to early adopters, it must have the following characteristics; show a relative advantage, be compatible with existing values and past experiences, have a simple complexity, ease of understanding and use, be trial-able before adoption takes place, and show visible results. In the later sections, the data we gathered from our mixed methods study is compared against these characteristics as perceived by new users. We undertake a mixed methods research because it has been used widely within the health care domain and most recently in some of the Podcasting studies cited in this paper.

3. Methodology

South Africa is currently one of the only countries in SSA with a handful of HEIs experimenting with Podcasting and mobile learning initiatives. In most cases, it is done by enthusiastic academics involved in audio recordings of their lectures. One way of ascertaining how pervasive ICTs are in teaching and learning, and what staff and students have actually been doing, has been to survey individuals. A number of studies have recently emerged which have used this approach (Czerniewicz and Brown 2006; Hodgkinson- Williams and Mostert 2006; Soudien, Louw and Muller 2007). Therefore, we present an indication of the state of Podcasting and challenges through interviewing six academics, a technician and content/curriculum developers mainly from the University of Cape Town (UCT) and one from Wit Waters Rand University.

In order to study how podcasting takes place and how tools support this activity, we conducted a two part study. Since this was an initial exploratory study, the first part involved qualitative interviews with academics to find out current practices and challenges of Podcasting lectures. This approach was used because it is particularly useful for studying phenomenon or events. The researchers completed six in-depth interviews with academics and content/curriculum developers. They were selected based on the fact that they had experimented with Podcasting during their lectures. A semi-structured interview schedule was utilized to facilitate in-depth exploration of academics perceptions of Podcasting and their experiences of its use. The interviews were conducted in lecturers' offices, meeting rooms and one on Skype – all chosen at their convenience. All interviews were tape recorded and transcribed to typed format for analysis. The second part of this study constituted a quantitative study with first year students in the faculty of commerce undertaking an introductory Information Systems course. Questionnaires were given to 132 first year students and they consisted of a background section and mixture of closed and open ended questions to allow for the respondents to express their perceptions on podcast use. Of the 132 that were administered, 7 were discarded because they were left blank, leaving us with a result of n = 125. The respondents were made aware that their responses are voluntary and will be treated with strict confidentiality. We therefore did not need to do any advertising to recruit participants for our survey as the questionnaires were administered during a tutorial session.

3.1 Environment Description

Ideally, one would expect that the technologically oriented faculties would be early adopters of ICTs in HEIs. For instance at the University of Cape Town, the Science departments include: Faculty of Science, Commerce, Health Sciences and Engineering and the Built Environment and below is a table that gives an indication of where instances of Podcasting have been seen; a tick represents existence whereas a cross (x) non-existence.

FACULTY	PODCAST USAGE
Science	X
Health Sciences	X
Engineering and the Built Environment	X
Commerce	✓

It is clear from the table that the Commerce faculty was the only academic department experimenting with Podcasting. The other University in Uganda, Makerere University had no incidences of Podcasting or its use whereas The University of Witwatersrand is undertaking small scale trials managed by their content/curriculum developers.

A gateway to other courses undertaken within the Commerce Faculty at the University of Cape Town, (course code INF1002) is taken by all first year students who are registered for programmes ranging from Accounting, Economics and Social Sciences. The course provides them with Microsoft Access and Excel skills before they can undertake other courses specific to their area of study. It offers theory and hands-on sections therefore lectures constitute conceptual and practical approaches. Enrollment for this course is about 700 full time registered students who are divided into two or more groups for easy management. The course convener and lecturers explored the use of podcasts as an integral part of students' support activities.

They initially set out to pilot Apple's podcasting solution, Podcast Producer during the second semester of 2009. Due to high implementation cost and prohibitive network connectivity, they eventually resorted to a cheaper video lecture recording method. A unique aspect of this approach was that equipment set up (usually done fifteen minutes before lecture starts), processing and distribution was done manually by the technicians. The equipment used included a Mac book connected using a Fire-wire cable to a video camera on a tripod stand, focusing on the lecturers' presentation computer (Usually a Windows Machine). The recording software used is factory pre-installed on the Mac book (i.e. iMovie).

The lecturers' set out to capture lecture recordings for INF1002 which is one of the first courses whose content was recorded in both audio and video formats. The goal was to report their experience from podcasting, identify the challenges and explore student's perceptions and usage of podcasts in order to elicit requirements for future tools. Students were informed at the beginning of the semester and during class of the availability of podcasts and instructions on how to access the files were provided during lectures.

3.2 Procedure/Data Collection

Using purposive sampling the researcher selected participants who had indicated by responding to an e-mail, their interest in taking part in further discussion. The criteria used for selection of the sample were those academics/content developers who had/were experimenting with Podcasting for their courses and as a result had agreed to participate. As this is a qualitative study in which the researcher was trying to explore and understand podcasting in developing HEIs so as to create meaning and vision, it was essential that the researcher select a sample who could articulate their thoughts and experiences and thus enhance the researcher's understanding of the concept. The potential staff population for our qualitative studies consisted of six participants. The academics had been lecturing for at least three years and were very enthusiastic about lecture recordings whereas the content/curriculum developers were providing support to lecturers who were trialing with Podcasting. Sample questions from our qualitative interviews included but were not limited to the following: How did you set up Podcasting infrastructure? Can you walk me through how and which tools you used? Is there anything you would have loved to see changed i.e. if you were to design an educational content authoring and presentation tool, what would it look like? Can you describe how students access the generated content?

Our quantitative study involved first year students in the Information Systems (IS) Department. During lectures, they are split into four smaller groups of about 180 students and taught by different lecturers. Towards the end of the 2009 academic year, we requested the course lecturer for permission to administer our instrument to students from one of the groups during tutorial allocated time. The survey sample was self selecting as IS was one of the only departments experimenting with podcasting lectures, particularly for the Introductory IS Course. The students who participated in the survey were taking traditional lecture classes, with no incentives or bonus points issued to students for participation. The questionnaires were given to 132 first year students and they consisted of a background section and mixture of closed and open ended questions to allow for the respondents to express their perceptions on podcast use. Of the 132 that were administered, 7 were discarded because they were left blank, leaving us with a result of n = 125. The respondents were made aware that their responses are all voluntary and will be treated with strict confidentiality. We therefore did not need to do any advertising for our survey. Since the majority of the students were freshmen, many of them were in the age range 18 – 21 years old. Qualitative data was collected from both academics and students to provide an expanded understanding of how they perceived the podcasts, their suggestions for enhancements, production and potential future usage within developing region HEI contexts. Just as with most studies, a number of limitations exist; for instance; the sample group seems small because the experimentation with Podcasting is not a university wide undertaking and only pursued by enthusiastic faculty, limitations are posed on the stratification and generalization of results. Potential bias may also exist resulting from the different mindsets of our respondents and some answering in groups of about two or three.

3.3 Data Analysis

Our concurrent mixed study generates two types of data i.e. quantitative survey student responses and qualitative data resulting from semi–structured interviews with academics and content/curriculum developers. On the one hand, the survey data necessitated the creation of a code book in order to convert responses into numerical form. We then undertook data entry using Statistical Package for Social Scientists software for the 125 questionnaires, performed data cleaning and generated descriptive analyses from the questionnaire responses as illustrated in the results section. On the other hand, qualitative data needs to be systematically analyzed. Therefore the interview data were subjected to a three-stage analysis method i.e. data reduction, data display and conclusion drawing.

Data reduction

Data reduction involves selecting, focusing, simplifying, abstracting and transforming the data as the researcher elicits meanings and insights from the words of the respondents. The researcher listened to each tape, transcribed each tape and then read each transcript several times in order to familiarize himself with the data.

In the initial stages of data reduction each line of interview transcript was numbered according to the question number it related to in the interview schedule. Once coded, all the interview transcripts were cut up into relevant question sections and then filed into the appropriate question folder. This meant that all the lecturers' responses to the questions were assembled together. The researcher also kept an original copy of each transcript nearby so that he could refer any passages back to the original section in the transcript to ensure that all comments were being analyzed in context. At this stage, the categories in the interview data were compared with the qualitative data obtained earlier in the questionnaires. Through this analytical process the researcher developed a familiarity with the data which guided and focused their questioning, so that linkages and potential hunches could be followed up and checked with the questionnaire data. The data were critically analyzed and questioned and six descriptive themes emerged. The six themes were as follows: Content appropriateness and availability, Content Transformation or Processing, Distribution Mechanism, Awareness of Availability and Accessibility, Intrusiveness and Organizational Issues, and Student and System Interaction. To increase validity, these themes were then reviewed within the context of each interview.

Data display

In the study qualitative data were presented in the form of narrative text, supported by excerpts from the data. Results and discussion were combined and the data display reflected the emergence of the six descriptive themes and was further enhanced by descriptive text.

Reliability and Validity

In terms of validity and reliability, we asked our respondents identical questions at different times to check for consistency of responses during a single interview and used respondent validation to ensure stability. In addition, qualitative research tends to espouse a constructivist ontological view of the world. As a result they are focused less on generalizability (or external validity) and more on reliability (the degree to which the data accurately represents the population being studied). Rather than establishing universal truths about the world, a qualitative study is about gaining an understanding of how respondents talk about their experiences and the meanings they associate with particular events, actions and claims.

4. Results and Implications

In this section, we present results from our studies; In particular, we reveal the technologies used followed by results on perceptions, the challenges faced and describe the themes that resulted from our analyses and corresponding quotes from the qualitative interview.

4.1 Technologies Used

Our preliminary studies reveal that there was no standard architecture for authoring lecture podcasts and that majority of our respondents had various improvisations. The technologies used are as highlighted below:

- A microphone connected to the public address system
- A desktop presentation computer running on Windows Operating system
- A Mac book connected to a video camera on a tripod stand pointing towards the presentation machine. The Mac book has software such as iMovie and Garage Band for recording and editing and compressing the videos.
- Vula Learning Management System (LMS) which was intended to host the recordings.
- Other scenarios involved the use of a stand-alone audio recorder or the one in-built into a laptop/personal computer to capture the lecturers' voice and the use of audacity to edit the mp3 files for manual upload onto Vula LMS.

4.2 Perceptions and Challenges

In this section, we explore based on the results from our mixed methods study the extent of diffusion of Podcasting by lecturers and content developers at UCT. We compared the data against the five innovation characteristics of Rogers' theory on diffusion of innovations.

Show Relative advantage: This is the degree to which an innovation is perceived as better than the idea it supersedes by a particular group of users. Our respondents revealed that Podcasting is viewed as supplementary to existing e-learning approaches such as the use of LMSs and not compared in such a way as to determine which is better as seen from the following quotes: *Benefits of these Podcasts include the issue of flexibility because it means that people do not physically have to come to one place at that particular moment….The second one is that of re-usability for subsequent classes…..broader access to resources e.g. you could really have leading, internationally re-known speakers in your class room without them physically being present*.

Be compatible with existing values and experiences: Refers to the degree to which an innovation is perceived as being consistent with values, past experiences, and needs of potential adopters. In fact, academics and students make use of already existing platforms such as Vula – a LMS for storage and access to recordings and other course resources. For instance, one of our respondents reported the following…..*What we have done is we just use Vula and we very simply recorded MP3 and just posted it onto Vula and the guys would just download it off Vula….. We compress it, break it/split it into smaller chunks and currently we are putting it onto Vula or the lecturers are putting it onto Vula*

Have simple complexity: Refers to the degree to which an innovation is perceived as difficult to understand and use. Overall, our respondents seemed to like the idea of podcasting but of the 125 students interviewed, only seven had listened to the lecture recordings at least once whereas only 4.8% (6) had downloaded them at least once per week. These respondents reported that they found the recordings useful and the qualitative interviews with the lecturers' validated this assertion. For instance, the lecturers revealed that some students on a number of occasions reported back saying the Podcasts were useful. However, 51.2% (64) had never downloaded the lectures. This is contrary to the works of Evans (2008) in which the students claimed to learn better with Podcasts compared to their own notes. The predominant reasons for this low usage as reported verbatim included:

"…….Sometimes the formats do not work…….I have not needed extra lessons…..……I am at par with the course…….. ……..Sometimes they cannot be found……they take forever to download…..……..I am not that patient and I never knew they existed among others". Table 1 below gives an indication of the download frequency of the podcast lectures by the students.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	64	51.2	58.7	58.7
	Once or twice this semester	45	36	14.7	73.4
	Total	109	87.2	100.0	
Missing	System	16	12.8		
Total		125	100.0		

Table 1: How often you have downloaded lectures

Ease of understanding and use

Students were asked to indicate whether they were aware of the availability of podcast lectures. Figure 2 below reveals that only 28% (35 students) of our respondents knew about the availability of podcasts whereas the rest were not aware. This may also have contributed to the low usage figures by the students. The reasons for this may have been the fact that lecturers' only mentioned the Podcast availability during class, were not involved in production (as a result were not sure of what happened during and after production) and it was not a requirement for students to access them. In fact, some students viewed them as extra lessons which they did not need. Perhaps, the lecturers need to play a role in incorporating Podcasting into their lectures and increasingly motivate students to access them.

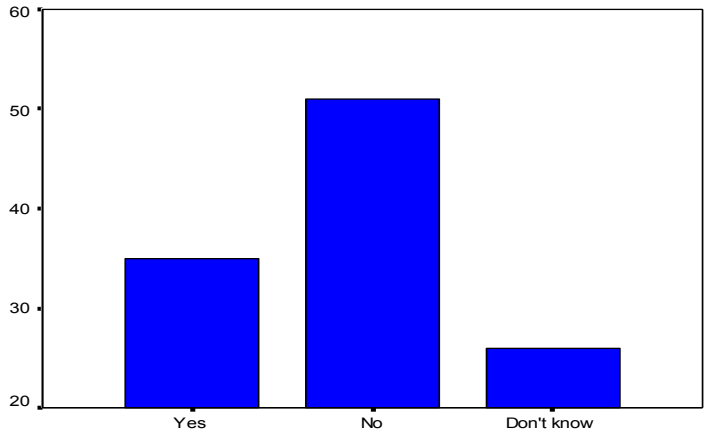

Fig 2: Awareness of Availability of VR lectures

Be trialable: This is the degree to which an innovation can be experimented with on a limited basis. Figure 3 reveals that 15.2% (19 students) of all those who listened to lecture recordings at least once used a laptop or desktop computer as the primary access tools. The reasons for this are the fact that a great number of students interviewed primarily use university provided infrastructure - which is normally inadequate given the large student populace. Majority of the students also did not have access devices off-campus – a challenge shared by many of the lecturers interviewed. For instance, one of our respondents from our qualitative interviews revealed that while Podcast lecturers may help increase access channels to content, educators need to be wary or aware of what access devices their students' possess – considering the fact that majority students in developing HEIs are from disadvantaged backgrounds. Therefore, we need to explore alternative ways in which these lectures can be distributed such as mobile devices (Hurst et al., 2007) since almost all students owned at least one.

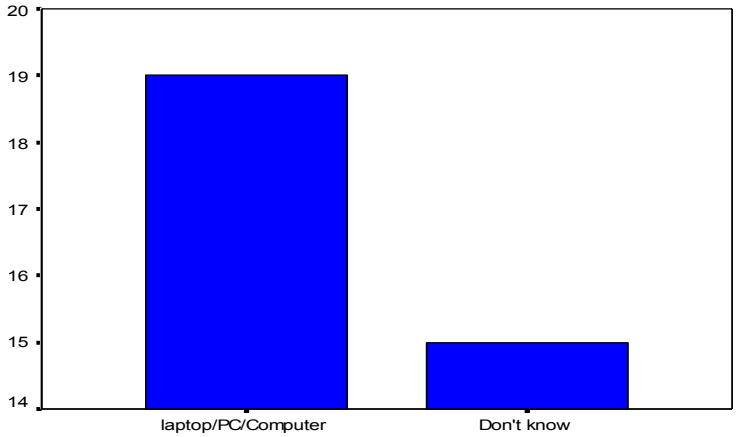

Fig 3: Devices used to access VR lectures

Our respondents preferred lecture recordings to be presented to them in various ways as quoted below:

- ✓ *"It would be nice to access them as video presentations on Vula with notifications saying a new lecture recording has been uploaded……. where notifications work like face book notifications"*
- ✓ *"Bluetooth"* - Students are used to sharing media such music, video and image files using Bluetooth which is free (as cost of access is a major limitation to the diffusion of technologies in the developing world). Therefore, developing content in formats that are consumable on for instance mobile devices (whose penetration is high e.g. in Africa) and transferable through Bluetooth to other devices presents various possibilities.
- ✓ *"Make listening to the recorded lectures part of the tutorial…"If all classes had them and listening to them would count towards attendance"*
- ✓ *"Put it on a common folder so that students do not have to download it because it takes long"*
- ✓ *"On a CD or flash drive"*
- ✓ *"Use formats that can be played by majority of players"*

Of particular interest is the use of mobile phones and Bluetooth to access and share the lecture Podcasts. Figure 4 below reveals that 36.8% (46 students) would access lecture recordings using their mobile phones, 12.8% (16 students) said no whereas the rest were not certain.

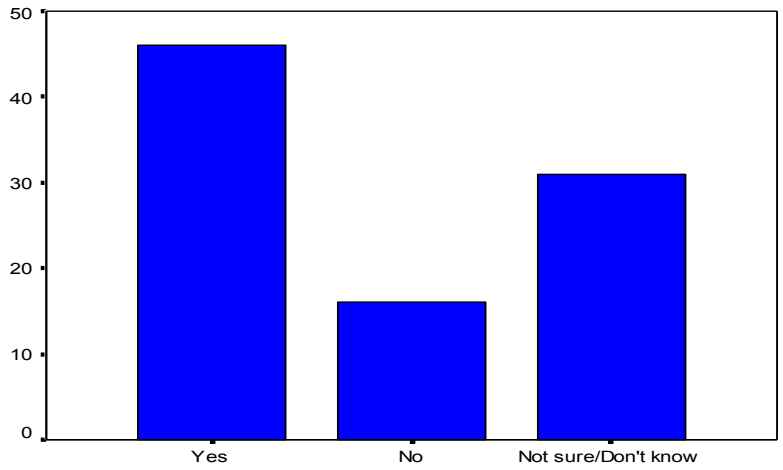

Fig 4: Access of VR lectures on cell phones

The students encountered a number of challenges during access e.g. off-campus access issues, incompatible formats and Lecture Podcast upload delays and a limited ownership of personal computers by students. It is normally very difficult to access university resources off-campus as students have different connection speeds.

Of those who accessed podcasts, 3 (2.4%) mentioned it as a major problem, 8 students (6.4%) said the files could not open whereas 14 (11.2%) were categorized as other. Similarly, the low podcast usage by students was attributed to a number of reasons i.e. 10 students (8%) said they had no computer as many of the students share the limited number of laboratory computers, 24 (19.2%) of the students said that they did not know how to download the recordings, 18 (14.4%) did not think they needed extra help whereas 17 (13.6%) had no time to download the material. The results from the qualitative interviews are as summarized under the following themes:

4.3 Resultant Themes

4.3.1 Content appropriateness and availability

The academics argue that content type and appropriateness is of paramount importance when using video recorded lectures as this greatly influences use. For instance, one of the lecturers identified that their students are more visual, hence the need for content that fits that requirement. One of the academics suggested that it would be appropriate to have both slides with audio as illustrated in the verbatim quote that follows; "*They have slides and can also hear and (Access audio). I tell them for instance to go to slide number 5, and slides and audio work together. For me it is for students to revise but I doubt if they use them for that… ummh revision is the best way. For instance you get students who will always be asking you to do this so if you can refer them to podcast X it would force them to go back and review them/listen to them*".

4.3.2 Content Transformation or Processing

As mentioned earlier, there is need to have an automated way of transforming and processing the content into formats that are easily consumable without the need for client software. In the current state, our interaction with the academics reveals a manual and time consuming approach as quoted below; *"……there has to be a way of formatting the podcasts such that the noise is out…….I know I can or should be able to start formatting the podcasts but I do not have the time, that is extra work and do not have the time to go over what I have already said……..But now we have to use a manual method of recording and transforming files……."*.

4.3.3 Distribution Mechanism

During our interaction with lecturers, they revealed difficulty in distributing content. For instance, it was common to take from 48 hours to several days before uploading content to a shared drive. Interestingly, the academics when interviewed did not know where the manually compressed and edited video recordings were stored and yet they had the ultimate responsibility of transferring the media files from the shared volume into their course folders in Vula for students to access. Despite the possibilities availed by mobile devices, content distribution and adequate application scenarios have to be considered.

The challenge is how the media can be offered to the students in such a way that no expert knowledge or additional software (which in most cases they cannot afford) is required (Ketterl, Mertens, & Morisse, 2006) as quoted verbatim in the following text; *"……and then may be if there could be a way to distribute files much better - that would be great……..One of the major challenges is the distribution of files. They have gotten to a point where recordings are being made but distribution of the files to the students is a major problem….."*

4.3.4 Awareness of Availability and Accessibility

Our survey with the students revealed that they were not aware of the availability of video recorded lectures and how to access them - a concern also shared by the academics. In addition, the academics did not know where the recordings were stored and had never downloaded them. The recordings were also made available in QuickTime format which the majority of the students and academics did not have installed on their computers. This could have resulted from the fact that despite the ways in which the lectures were recorded and made available, a lot of the work to accomplish this task was delegated to the technicians. Hence there is need for academics to own the process through easy to use tools and also to incorporate the use of lecture recordings within the curriculum (Baker et al., 2008). The quote below gives an illustration of the above issues; *"……If we are looking at a 2 hr lecture, we have to split that file into 2 because we obviously do not want to make it a huge file so that people stand for 3 - 4 hrs downloading a file. ……I do not know how students get access to content and that is one big problem……You will find that many of the students are not aware of the availability of podcasts".*

4.3.5 Intrusiveness and Organizational Issues

One of the lecturers expressed the issue of intrusiveness during the recordings and the added pressure to perform. They felt that this in some ways affected the way they interacted with their students because lectures normally incorporate telling jokes, stories and real life examples outside the scope of the class content as indicated in this quote: *"…..there is need for lecturer to be made aware of the eventual purpose of the audio content that results from the lectures she gives e.g. have to be careful of the words I use…….lecturer feels there is added pressure into being more explicit with explanations since students are going to listen to content afterwards……..it needed a whole lot of organization and management because we had to fight to secure the labs and it was not easy at all ……"*.

4.3.6 Student and System Interaction

The academics also mentioned that they had difficulty interacting with the system and students as quoted below: *"…It is difficult in terms of interaction that I struggle a bit with because when I am lecturing, I like to be able to see students, interact with them, and ask questions……..podcasting should not have as much user interaction as it is currently. It should be a fairly fluid system……..the process of switching between screens is annoying…..If everything was synchronized so that it could be done easier……During recording, lecturer has to be in one place and it is difficult …… They are sitting all around me and some are seated in other smaller labs within the general lab area …….It is difficult in terms of interaction……."*

5. Implications

The goal of this work was to gain knowledge on how academics approach production of podcasts; explore perceptions and present preliminary results for podcasting in developing HEIs (More formal studies are required to understand the effect podcasting tools have on learning). In this section, we present an analysis of podcasting tasks by academics and podcast use by students. The authors draw attention to a number of characteristics. One of the single important factors for creating podcast lectures is the content type and appropriateness. Podcasts may be presented in various forms i.e. audio, recordings of lecturer with presentation and various other combinations. Surprisingly, our study revealed that some of the challenges students and academics presented was the difficulty in downloading recordings due to large sizes, the need for visual content and the need for software (i.e. QuickTime) on client machines to download lectures. There is a need for automated compression mechanisms to package content in such a way that the files are easily downloadable and shareable among users. It is also important to take into account the consumption devices. (Welte & Jung, 2007) Reveal that the added value of e-lecture podcasts is in their potential for mobile usage. The end devices used include: smart phones (more available to students in the developed world). The majority of students interviewed in our study for instance own feature phones - those that offer basic functionality i.e. a camera, Bluetooth and WAP services and use shared computers on campus.

Academics mentioned the use of audio narrations that link to each PowerPoint slides but developing tools to produce such content is a challenging task. . Another important factor for creating podcasts is the ease with which academics should be able to create them. From our study, we learned that academics complained of the usability of current tools. We argue that this is due to the fact that the current setup requires a lot of support from the technicians. Interestingly, academics were completely dependent on them for production of video recorded lectures. This may have been attributed to the fact that academics viewed it as extra work due to its manual nature. Many of the academics viewed ease of production as being able to click a start and stop recording button. Although this does not require any intervention from technicians, they always forgot to start or stop the recordings during lectures. This could be solved by developing easy to use interfaces to support the production and post processing activities. There is also a need to involve academics in the design of these tools in order for them to feel that they own them and ultimately be motivated to use them. A number of research papers present different ways of production and claim ease of use and low cost but majority of the techniques are still labor intensive do not provide the required automation.

After production, the recordings should go through post-processing in order for them to appear in the necessary formats, with the required media augmentations and for the intended end-user devices. From our studies, the technicians were involved in manual post processing. This took from forty eight hours to several days before they made these recordings available. As a result, academics lost track of the lecture podcasts and some students gave up due to delays in availability. The technicians stored the post processed files on a shared volume from which academics were supposed to access them and upload onto their spaces in Vula.

Interestingly, academics did not know what happened to the recordings after lectures revealing the disconnect in the entire production process. Similarly, a great number of students claimed not to be aware of the availability of video recordings despite being reminded during class. Moreover, academics also did not know what happened to the recordings after the lectures.

There is a need for mechanisms to notify students of availability of new recordings. Moreover, this would reduce the time lag between processing and distribution of recordings. Some of the students suggested electronic mail notifications or those similar to face book ones. Some of the current tools use Real Simple Syndication feeds to synchronize content to users' end devices but Welte et al. (Welte & Jung, 2007) argue that students normally have very strict deadlines and normally know when new lectures are available; therefore RSS is not important and does not present any added value. However, they suggest that the possibility to replay recordings "anytime – anywhere" seems to add promising value. Lecture Podcasts may, of course, be used for revision, but they can also be shared using technologies such as Bluetooth. The use of sharing for the students we interviewed seemed to present added value and save download time. It is not clear how this would impact on attendance and influence learning. An interesting use of Podcast sharing is when students take recordings for others. However, many solutions seem to use a combination of already existing tools to create lecture Podcasts.

These normally require a lot of support from technicians and do not empower academics to create the content. A number or studies have presented advantages for use of these technologies in learning but many of these are pilot studies. There is need for more full scale studies on the impact that this technology will have on learning. Nevertheless, there appears to be some valid uses i.e. students with disabilities, for one, would benefit from this type of content and in distance education. In summary, we argue that providing these lecture Podcasts is not sufficient. There needs to be a means for them to be incorporated into class activities to increase usage. Students need to be engaged in some process whereby s/he needs to review them before they study for the exam. The comments from the survey echo this opinion.

6. Conclusions and Future Work

This paper reported on an explorative study of lecture podcasting in the department of Information Systems at a developing HEI. Firstly, it presents some background to Podcasting, critical review of relevant literature, provides the current state of ICTs in HE in Africa and the state of ICT diffusion. Rogers' diffusion of innovations theory provided the framework for this research including determining how new innovations are disseminated, the rate of adoption, the five stage decision making process for adoption and the characteristics an innovation must possess to be attractive to adopters. The methodology used relied heavily on descriptive and qualitative data analyses in order to determine the current podcasting practices and experiences considering the existing infrastructure constraints, limitations and perceptions of Podcast usage and opportunities for future technology enhancements. By assuming some of the respondents are "Innovators" or "early adopters", they are still in the early five stage decision making process and that they may be of benefit to the new innovation by encouraging late adopters in its uptake.

Over the years, there has been continuous research on recording lectures. As a consequence, there are a number of approaches to record lectures, each posing its own challenges. Moreover, a number of tools have been developed within the developed world contexts, whereas others incorporate a combination of various tools to undertake the various tasks of podcast production. Thus it is no surprise that we find ourselves investigating podcast experiences in developing HEIs and contextual tools therein to perform production tasks. There are several directions for further research and development: One is to apply our findings to the development of new products and services. Since the lecturers, who were our lead users (Lüthje & Herstatt, 2004; Von Hippel and Herstatt, 1992; Von Hippel, 1986) are "Early Adaptors", conclusions can be drawn that there is little progress with Podcasting in developing world HEIs through the five stage decision making process. In addition, the podcasting experience appears to be lacking in possessing the important characteristics that will aid in its adoption. Perhaps the approaches taken by interaction designers do not radically change lecturers' ways of lecturing, but rather use them as co-designers of podcast systems through techniques such as Participatory Design. By using these techniques, our users own the design and ultimately adoption should be less problematic. Despite limited initial success, we argue that lecture recordings and other media combinations can be produced using an integrated system. The lecture Podcasts seemed not to provide much added value.

This argument is supported by the large number of students who mentioned that *"they had no real interest in the recordings and viewed them as extra lessons"*. Similarly, a number of studies, models and frameworks have been developed but majority tend to focus on podcast usage by students and how they helped learning. They assume that the podcasts are already created and therefore dwell on usage and how they impact learning. The implication for practice, policy and research is that, Podcasting needs to continually exploit the notions of technology and lecturer preparation, have necessary buy-in from management and be integrated into curricula in some way and more research done into appropriate contextual tooling. Understanding the purpose of using the technology requires differentiation between learning the technology in itself or as a tool to communicate learning. We therefore argue for more research into theories, models and frameworks that take into account empowering academics to author podcasts/media with limited effort.

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