

Lecture Capturing utilising Enhanced Podcasts

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Abstract

The advent of podcasting technology has transformed lecture capturing and enabled easy and cost-effective delivery of recorded lectures to students in Higher Education. This paper investigates the use of an Enhanced Podcasting model to distribute audio recordings synchronised with the slides used in the lecture. A pilot study was conducted with two groups of students (first years and third years) to evaluate the acceptance and use of this technology as a supplement to traditional lectures. Enhanced Podcasting was evaluated as a model suitable to the South African context, enabling a richer experience than simple audio recordings, but still limiting bandwidth demands and equipment costs. The results reveal that a notable portion of students utilised these recordings and gave Enhanced Podcasting a high usefulness rating. The most popular uses of this technology were for test preparation and revision. Issues relating to access were identified and the viewing behaviour of students was also studied. Survey responses indicated that most students either download or stream the recordings for playback on computer with mobile viewing receiving almost no use. The vast majority of students reported receiving benefit from using the recorded lectures and indicated that they would prefer podcasting as a permanent service. They were also polled on possible alternative teaching modes. Both attendance tracking and survey responses indicated that podcasting had almost no effect on lecture attendance among first years with a small group of third years indicating that their attendance has decreased. This study suggests that the use of podcasting as a supplement to traditional lectures is clearly perceived as beneficial by the surveyed students, especially as a revision tool.

Keywords: podcasting; lecture recording; lecture casting; enhanced podcast; lecture capture; higher education; educational technology

1. INTRODUCTION

Traditionally Higher Education has been characterized by residential universities providing teaching in a lecture format with students all assembled at the same time in a physical classroom.

Several developments in the university context have, however, resulted in a situation where this traditional approach is fast becoming unsustainable. Advances in our understanding of the learning process of students have meant that we can no longer depend simply on a one-size-fits-all approach.

Work in the field of constructivism and connectivism have lead us to understand that the classroom lecture is not the only, or the most important, opportunity for learning (Siemens, 2005). In the connectivist tradition one can see online recordings as another input in students' learning process, empowering them to construct new knowledge and facilitating new learning opportunities.

At the same time universities are also under increasing pressure to find coping mechanisms to deal with incredible increases in student numbers. In the South African case this is of paramount importance since enrolment has increased tremendously since the new education system was implemented after the 1994

democratic elections. This increase in enrolment cannot be matched by a corresponding increase in universities' infrastructure, resulting in a situation where existing infrastructure and resources have to be applied to service far more students than originally intended.

The implication of these changes is that universities have to critically re-evaluate the existing lecture-based teaching model. Fewer contact lecture hours are available per student. Redesigning the teaching model can open up lecture slots both in terms of staff availability and lecture rooms.

An additional consideration brought about by the increased demand on universities is the success of enrolled students. Every student who has to repeat a module means that spot is not available for a new student. Support mechanisms are therefore being implemented to try and ensure that all students have the maximum success in their degree programmes – without compromising the quality of the courses presented.

These factors have prompted universities to investigate several different approaches, including tutorial-based teaching, student support groups, distance learning, telematics and many others. In this paper we propose that utilising enhanced podcasting technology can go a long way to addressing some of these issues.

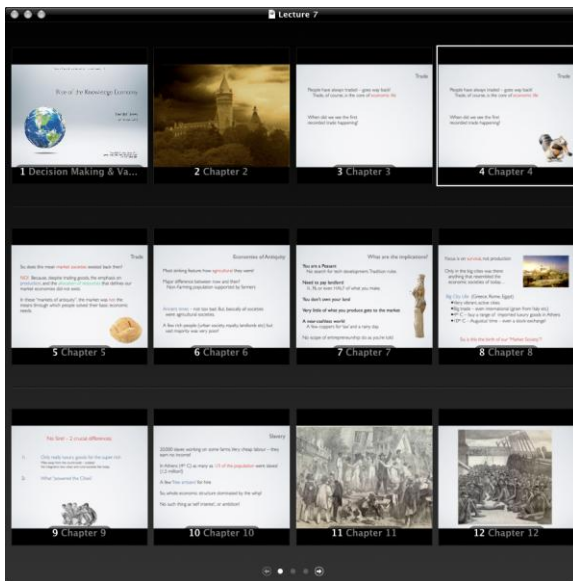


Figure 1. Software allows students to skip to a specific slide

2. USING ELECTRONIC TEACHING AIDS

Most universities in South Africa (and elsewhere) have also implemented some form of Learning Management System (LMS) to enable the distribution of content, administration of tests or exams and several interactive services. This type of computer-aided learning is the default position for students studying at a Higher Education Institution and therefore the use of technological aids in general teaching activities is no longer unusual or particularly challenging to students.

A larger (n=1141) study conducted among first year students, including those participating in the trial, also showed that *access to* (if not *ownership of*) a computer has become far less of an issue than it previously was. 93,93% of respondents indicated that they have access to a computer. Cellphone access was also almost universal (Centre for Knowledge Dynamics and Decision Making, 2010).

3. ENHANCED PODCASTING FOR LECTURE CAPTURE

The notion of recording classroom lectures is certainly not a new one. A vast array of different solutions is available on the market to create some form of audio or video recording of lectures. The goal of this paper is not to promote any specific methodology or software product. There are however certain considerations that are important to bear in mind when developing your approach.

3.1 Audio vs. Video

'Podcasts' traditionally refer to audio files distributed in a specific way over the internet (Hürst and Waizenegger, 2006). This type of audio transcript can certainly be used in the classroom. Several students already make recordings of classes and use these to review material.

Students are also regularly provided with a copy of the lecture slides used in classes, allowing them to make notes and refer back to these slides as an *aide mémoire*.

On the other side of the spectrum it is also possible to make high quality video recordings of lectures and provide these to students. Several products are available that allow the recording and editing of such video material. Unfortunately these are often very expensive and require staff with special skills to film and edit the recordings.

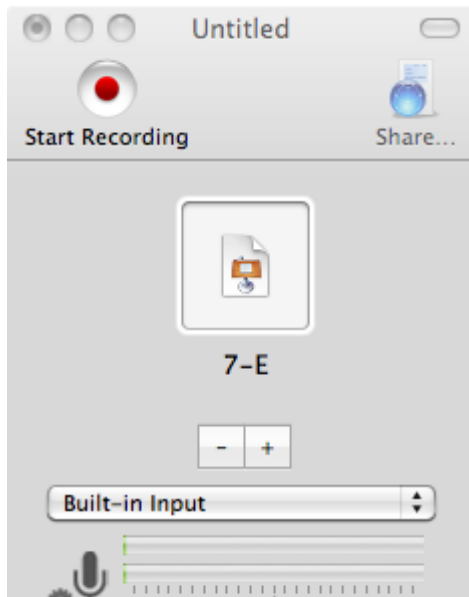


Figure 2. ProfCast has a very simplified and easy-to-use interface

In our case the requirements were quite clear. Lecturers wanted to provide an electronic record of a real-world lecture to students to *complement*, but not *replace* the traditional lecture format. These electronic recordings were not meant as a stand-alone product and we did not intend to use them as a separate channel for delivering teaching material.

Although audio-only recordings are easy to make, they lack certain features deemed important for effective use by students. Quite often classes rely on students being able to see certain illustrations or models to follow an argument. Furthermore, since lectures are 45-50 minutes long, it is a very uncomfortable recording length to listen to if you only wish to revise certain portions of it.

3.2 The Benefits of Enhanced Podcasts

As a compromise between the two extremes (audio only and video only) we chose to use a format known as Enhanced Podcasting. This format is primarily an audio file, but it has the additional benefit of being synchronized with static graphics. This enables the student to see the relevant slide on their screen, while listening to the audio recording. The slides also advance as they did in class during the lecture.

Additionally students can see a gallery of all slides and click on an image to navigate to that

part of the presentation – ideal for revising a specific concept.

Enhanced podcasts also have a much smaller file size than full video recordings. This is important, since South Africa still has limited bandwidth available to students. This recording format also allows students to download the files and play them back on any computer or compatible mobile devices (such as many cell-phones, iPods and MP3-players). Compatible devices will display the graphics on their screens as the audio is playing.

Podcasting has been identified as a viable teaching tool by several authors (Hürst & Wai-zenegger, 2006; Ractham & Zhang, 2006; White, 2009; Dale, 2007; Copley, 2007; Chandra, 2007; Malan, 2007; Evans, 2008). The use and acceptance of this type of technology has also increased as users became more comfortable with podcasting in general, and as the products have matured (Dale, 2007).

3.3 Authoring Considerations

Although we agree that full video recordings of lectures would be preferable (at least as an available option), in practice this is simply not attainable in the South African context. To provide full video recordings, relatively expensive video-equipment would be required in hundreds of lecture venues. Good quality recordings would also require specialized staff to operate the cameras and edit the recordings. The Enhanced Podcast approach requires only the installation of very inexpensive software on the lecturer's computer.

The entire lecture-recording project would of course not be possible without the buy-in of lecturing staff. Several points of concern were identified among lecturing staff. Foremost of these was the clear indication that they cannot spend hours editing and producing these recordings – especially when they teach several classes per day. The Enhanced Podcasting approach enables lecturers to simply click on "record" when they start their lectures and "end" when they are finished. This easy one-click interaction with the system requires almost no training and the effort involved in producing these podcasts is negligible. This software is very affordable, and suitable to lecturers presenting in several different physical spaces without their being reliant on the availability of specific equipment.

Looking at the entire cost of the system and the sustainability of the project given resource, equipment and staffing constraints it became clear that Enhanced Podcasting provides a good compromise between rudimentary audio-only podcasts and expensive full video vodcasts. This being said, in practice a mixture of formats will be utilised with Enhanced Podcasting identified as a suitable default approach.

4. METHODOLOGY

Several individual lecturers at our institution are already using some form of lecture capturing in their modules. This trial was conducted to try and establish a best practice guide for campus lecture capturing, and investigate some of the issues raised by lecturers themselves.

For this experiment two different modules were identified and lecture material provided both in the traditional format (PDF copies of lecture slides) and in Enhanced Podcast format (.m4a files).

Student usage of these podcasts was monitored. Additionally, interviews and surveys were conducted and class attendance and other metrics recorded.

4.1 About the selected modules

The first module selected was Value & Policy Studies 114 (VPS114). This is a first year module covering the rise of the Knowledge Economy. The content includes both conceptual development and basic history and introduction. The lectures were presented in two languages (English and Afrikaans) in separate groups. This relatively large group (n=279) met three times per week. 24 lectures were recorded (in both English and Afrikaans – 48 in total).

The second module was Socio-Informatics 324 (SI324). This is a third year module dealing with Systems Thinking (and several aspects of Systems Theory). The focus in this instance is a much more advanced understanding of systems and related concepts. This module was presented in dual medium (use of both English and Afrikaans in the same lecture) to a single group. This class was medium sized (n=101) and also met three times per week. 18 lectures were recorded.

Participants came from a variety of degree programmes in the Arts & Social Sciences and

Economic and Management Sciences. Using the podcasts was not compulsory and no additional incentives were provided either for using the podcasts or for completing the survey.

4.2 Lecture Capture & Distribution

Lectures were presented in classrooms equipped with data projectors. Slides were shown using the lecturer's own MacBook Pro running standard Keynote software. Sound was recorded using the MacBook Pro's excellent internal microphone.

Initial trials were conducted using the built-in PowerPoint feature for synchronizing audio and graphics. Unfortunately this proved to be far too unreliable to use in this investigation. Several other lecture capturing and screen capture applications were evaluated. Some of them had enormous feature sets, but were also very expensive or required dedicated equipment. Some worked very well but generated enormous video files. Most required extensive training before staff could use it and every lecture had to be edited before publication. There are also a myriad of tools available to record sound and slides separately, but this requires manually synchronizing the soundtrack with the slides – a requirement that is far too labour intensive.

Eventually we selected HumbleDaisy's ProfCast softwareⁱⁱ. This application integrates with your presentation software (Keynote/PowerPoint), allows you to record audio and automatically exports an Enhanced Podcast with synchronized graphics. This software is very simple to use and extremely stable. It addressed all of our needs (including affordability).

No additional editing was done, with the exception of entering the lecture topic in the meta-data. Files can be exported in several compatible formats. For this experiment .m4a was selected due to variety of devices and software applications. The format allowed files to be compressed while still maintaining excellent sound quality and graphic fidelity. The average 40-50 minute lecture resulted in a file size of 46,7 MB. The graphics were exported at a size of 1024x768. Due to the small size of the files, special iPod-sized versions were not created – although this is possible. It was recommended that users play the files using QuickTime. An instruction guide and download link was provided for users who did not have the required software installed.

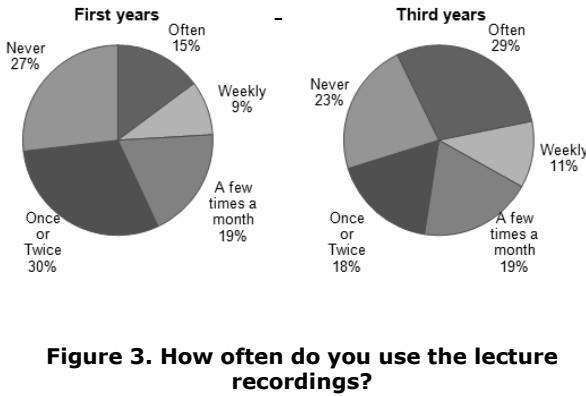


Figure 3. How often do you use the lecture recordings?

Exporting and saving the files on average took less than 15 seconds and did not require any user intervention. Although the software allows for distribution using an included tool, we distributed the files using the existing Blackboard (WebCT Vista) platform used by the university. This provided a familiar interface for students accessing the files. It also allowed us to use the existing access control mechanisms required by the university's copyright regulations. Blackboard also tracks the usage of these files and provided us with the necessary metrics for evaluating usage statistics.

Since Blackboard was used for distribution, no RSS-feed or syndication service was provided. Unfortunately no production-level podcast module was available for Blackboard at the time. The university is, however, experimenting with several other ways of distributing the material including iTunesU and Camtasia Relay.

These new Enhanced Podcasts were provided in addition to the PDF lecture slides and were generally available within a few hours of the lecture.

5. RESULTS

This study used a combination of qualitative and quantitative methodologies to gain insight into the questions researched. Data gathering included interviews, surveys, attendance records and usage tracking data. Results for both the first and third year modules are presented throughout. Only in cases of both qualitative and quantitative significance will the distinction between the two groups be commented onⁱⁱⁱ.

5.1 Lecturers

5.1.1 General issues

First we interviewed lecturers involved in podcasting at the university. Data gained during

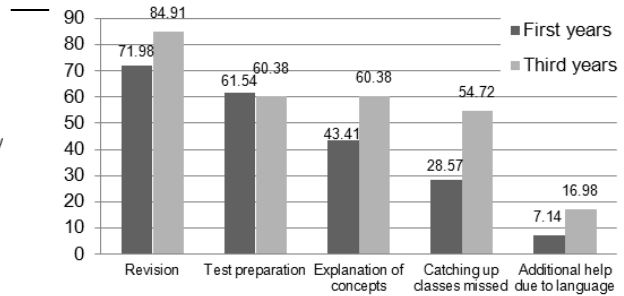


Figure 4. Why do you watch the recordings?

this process was also compared with experiences during this trial podcasting project.

Lecturers who were questioned about their willingness to start podcasting their lectures raised several concerns. The primary issue identified was that staff did not have the time or resources to start using any product that is labour intensive. Although they saw the potential of the product, they simply did not have time or energy to learn an intricate system or edit individual lectures. This was also the case in other studies (Ractham & Zhang, 2006; Malan, 2007).

Concerns were also raised about expected usage of this type of recording. Some lecturers expressed concerns that a lot of effort would be made to record sessions with no guarantee that anyone would use the recordings.

Several lesser concerns were also raised. The first of these was the fear that recorded lectures (or rather the availability of recorded lectures) would serve as a disincentive for students to attend formal lectures. The expectation was that students would have no real reason to keep attending classes if a video version was freely accessible.

Some lecturers were also self-conscious about having a recording of them made (and preserved indefinitely). Lecturers expressed concern that a permanent record of all classes would mean that any student could go back in time and point out any mistakes the lecturer made.

During the trial project these concerns did indeed play a role initially, but the lecturers quickly adapted to these considerations. The starting point should simply be that one should expect lecturers to occasionally misspeak or make mistakes. This technology allows for these errors to be detected and corrected. Furthermore, lecturers should not be seen as

some ultimate authoritative source, but simply as the fallible human beings they are.

Lastly, issues regarding copyright were raised. At the university in question regulations dictate that the copyright for all lecture material resides with the university. This trial only published these recordings on an access-controlled platform and the podcasts could only be seen by students enrolled in the course. This adequately addressed the copyright requirements for the trial. Publication of the recorded lectures outside of such a system could, however, raise new issues.

5.1.2 Trial experiences

The success of any podcasting implementation is not only dependent on the system and the user acceptance, but also on a commitment by the lecturers to use the product. To test the usability of this type of recording system four lecturers (in addition to the main trial lecturer) were asked to test the software and share their experiences in recording lectures.

None of the four test cases reported any notable issues in using the capturing software. During the entire test phase two crashes occurred resulting in the recorded lectures being lost. Both these cases were caused by the same bug in OSX and the problem was fixed in update 10.6.3 released by Apple. Since installing the update no further crashes have been reported.

The software was tested on both Apple OSX and Windows Vista / Windows 7 computers running either PowerPoint 2007 or Keynote 5.0.3.

In all instances the software was intuitive and easy to use. Lecture recording resulted in no notable interruption to classes or additional workload for lecturers. The only difficulty reported related to the cumbersome process for uploading lectures to the Blackboard system^{iv}.

5.2 Students

For this trial, students' usage of the available podcasts was tracked using Blackboard. Their class attendance was also recorded during lectures. Finally an electronic survey was sent to all the enrolled students. For the first years this survey had a response rate of 77,4%. The third years had a response rate of 61,3%. Since all students were invited, but not all answered, some self-selection sampling error should be presumed. Users indicating that they had not used the system were not required to

answer subsequent questions. Every question also had an *n/a* option.

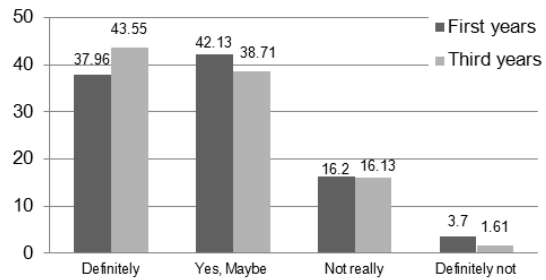


Figure 5. Do you think the recordings contributed to your success in this module?

5.2.1 Podcast usage

Blackboard tracking was used to investigate the usage patterns of users. Unfortunately the standard tracking feature did not provide very rich information on the exact access times and did not distinguish between repeat downloads and unique hits. Due to these shortcomings the focus was placed on the reported usage data obtained through interviews and in the student survey.

In terms of usage patterns it seems that most students accessed the recordings shortly after the lecture (within 48 hours). A smaller group also periodically downloaded all available lectures (once a week or once every two weeks). This can be attributed to the fact that most users preferred to download the relatively large files from the university's network (more about this in §5.2.3).

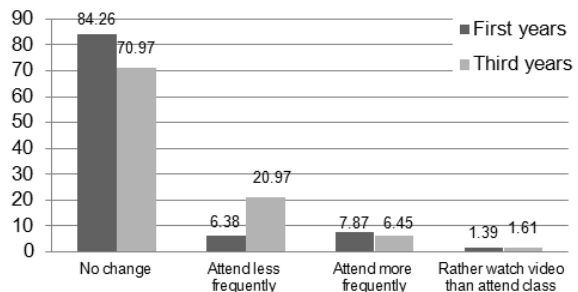


Figure 6. How did the availability of the recordings impact your class attendance?

Predictably, several students also downloaded the recordings more than once – redownloads occurred specifically just before test and exam dates.

When asked about their usage of the recordings, the majority of the group (43,06% ; 59,68%) said they frequently used the facility (more than a few times a month) with a small, but notable group (26,85% ; 22,58%) indicating that they have never used the recordings (see figure 3).

These figures exceeded expectations and are very encouraging, given that no special effort was made to incentivise students to use the recordings. This also matches the reported demand under students found in other studies (Greenberg & Nilssen, 2009).

Unfortunately validation of the reported data with Blackboard usage tracking is not available at present^v.

5.2.2 Usefulness

Users were asked to evaluate their perceived usefulness of the recordings on a 5-point Likert-scale. The average rating among first years was 4,18. Third years gave an average rating of 4,48.

Informal discussions with students using this system seemed to echo these findings. Most users described the podcasts as "very useful" and reported using them for a variety of purposes.

The higher figure among third years may relate to the more conceptual nature of the course. That being said, the difference is quite small and is not seen as important.

Users were also polled on the reason they use the podcasts. Several options were presented, with respondents asked to select all applicable options.

First years indicated they primarily use podcasts for *Revision* (71,98%) followed by *Test preparation* (61.54%), *Explanation of concepts* (43.41%), *Catching up classes missed* (28.57%) and *Additional help due to language issues* (7.14%).

Among third year students the main use was *Test preparation* (84.91%) followed by *Revision* (60.38%), *Explanation of concepts* (60.38%), *Catching up classes missed* (54,72%) and *Additional help due to language issues* (16.98%).(see figure 4)

Clearly students were utilising these recordings in the same way as the lecturers intended them – primarily as a complementary resource intended to revise material discussed in class.

Concept revision was also more prevalent in the third year group, as was to be expected in a course dealing with several difficult concepts.

Students were also questioned on the ease of use of the system. Once again this was a simple score out of 5.

First year students gave an average rating of 3.65 and third years rated it at 4.02. In both cases a small percentage of users (6,48% ; 6,45 %) indicated that they could not get the recordings to play at all. As expected, the third years demonstrated more developed information skills and therefore found it easier to play the files. In both cases, however, the rating was lower than expected.

By analysing the open responses, a few technical issues were identified as obstacles. Many of these related to using Blackboard as the distribution system. Some users also experienced difficulty saving the files on flash disks in computer areas due to browser restrictions imposed by IT. Issues were also reported with transferring .m4a files using Nokia Media Manager. Users accessing these files from outside the university network reported some bandwidth related issues – especially when trying to stream these files.

5.2.3 Access

In South Africa sufficient internet bandwidth and computer access is still far from ubiquitous. For this reason many international products (especially those generating large files) are not suitable. The university provides computer and network access to all registered students. To better understand the demands placed on the podcasting system, users were also asked a few questions relating to the way in which they accessed the recordings.

The first question related to where they accessed the recordings. The majority of users accessed recordings from the *computer user area* (60,65% ; 45,16%). This was followed by *private internet (at home or flat)* (30.56% ; 43.55%) and *campus network (residence)* (30.56% ; 37,10%). A negligible group of students (1,39% ; 6,45%) reported that they use some type of mobile device to watch the recordings.

The percentage of students viewing the enhanced podcasts on a mobile device is substantially lower than that reported in North American studies. Unfortunately reliable own-

ership figures were not available for the trial group.

Far more first years elected to stream the recordings in the browser (54,71%) compared to third years (28,30%). The rest chose to download the recording and watch it later. Many students (50,93% ; 47,77%) also chose to download the recording while on the university network and save it for use at home or off-campus.

Of those downloading or streaming the files using a private internet connection a substantial amount (59,43% ; 54,54%) indicated that the cost associated with downloading the files is a concern.

5.2.4 Efficacy

Ultimately the goal of any teaching aid should be to contribute towards the successful learning of the students using the aid. Measuring this contribution is unfortunately very difficult.

Ideally we would like to ascertain the efficacy of this tool by evaluating the effect of it on student success. Unfortunately this proved to be an impossible task. The varying composition of the class and content of the modules made comparison to previous years unsuitable. The small size of the test groups also made any kind of control group testing unpractical. This left the researchers with no alternative except simply asking students to share their experience and perceived value of the system.

When asked if they thought the recordings contributed to their success in the module 80,09% of first years and 82,26% of third years answered positively. This was broken down into *Definitely* (37,96% ; 43,55%), *Yes, Maybe* (42,13% ; 38,71%), *Not really* (16,20% ; 16,13%) and *Definitely not* (3,70% ; 1,61%). Although these reported figures probably overestimate the impact of these podcasts, it is quite clear that at least some positive value is perceived by the students in the trial group. (see figure 5)

When asked if they thought lecture recordings should be made available, the vast majority (83,33% ; 93,55%) indicated that they thought it should be available and that they would use it. A smaller group (12,96% ; 3,23%) thought it should be available, but they would not use it themselves. A very small group (3,7% ; 3,23%) thought that recordings should not be provided since they were unnecessary.

When asked about the advantages of watching the podcasts, several factors were identified. The most prominent use of the recordings was to review issues and concepts that students did not understand fully or follow in class. Several students also indicated that they used the recordings as a knowledge base to revise concepts they had forgotten or later realised they had not fully mastered. The indexed recordings (providing slide previews) made this function quick and efficient. Some students also reported having less anxiety about missing something in class. They indicated that they now pay full attention to the explanation in class, rather than spending time frantically making notes. Note taking and summarising is done when they review the recorded version of the class. Being able to pause the lecture to make additional notes was also described as an advantage. Students missing classes for a variety of reasons also indicated that they could catch up on the work they missed – one student even indicated that she followed the missed lectures from her hotel room during the week she was unable to attend class due to international sporting commitments.

A small number of students also indicated that this was the only way for them to access the course content due to timetable clashes or language issues. Having the first year lectures available in both languages provided a safety net for these students.

One hearing-impaired student expressed his/her desire to also see a video recording of the lecturer since this would enable her/him to lip-read.

5.2.5 Class attendance

One of the major issues relating to lecture capturing identified in the literature (White, 2009) is the possible effect on class attendance. This issue was also raised by the lecturers interviewed in this study and even by a few students in the survey they completed.

To evaluate the effect of making these recordings available to students, class attendance in these modules were compared the class attendance of the same modules during the previous academic year. No noteworthy difference was found (average class attendance increased by approximately 2%, but this was not deemed important due to several other factors which could have an impact, as well as annual deviations in this figure)^{vi}. Simi-

lar results have been reported in other studies (White, 2009).

Table 1. Question asking which teaching mode students would prefer if given the choice

Mode	First Years	Third Years
100% class attendance (as current)	50,7%	41,9%
Majority class attendance with some lectures only by video	30,4%	30,6%
Majority lectures by video with some class lectures (different content)	8,3%	9,7%
Majority lectures by video with some discussion classes or tutorials	7,8%	9,7%
100% video	0,9%	0%
Other	1,8%	8,1%

Students were asked how the availability of these recordings impacted their class attendance. The majority (84,26% ; 70,97%) indicated that it had resulted in no change. A smaller, but noteworthy portion (6,38% ; 20,97%) reported that they attended less class. This group was noticeably larger among third year students. A small group (7,87% ; 6,45%) answered that the recordings actually increased their class attendance. A very small percentage (1,39% ; 1,61%) indicated that they now rather watch the recording than attend traditional lectures.

In the open response section several students motivated that they still attend traditional lectures due to the interactive nature of the classroom environment. Students also reported that they appreciate interacting with other students and engaging with them when they ask questions. A few respondents noted that the use of the built-in microphone means that these student interactions are not adequately captured on the podcast recordings. Many students noted that these recordings are considered as a supplemental resource (also "backup", "safety net"), not as an adequate replacement for lectures. Some suggested that only stu-

dents who attend class should have access to the recorded lectures.

With regard to good teaching practice, this distinction becomes crucial and is also echoed in other studies looking at podcasting as a form of augmented learning (Brotherton & Abowd, 2004; Copley, 2007).

5.2.6 Teaching mode

Respondents were asked about different ways of integrating recorded materials in the teaching process. The results are shown in Table 1.

From this it seems quite clear that students prefer to have some form of traditional lecture, although they are open to new formats. Note that the question tried to determine preference, not acceptability.

6. DISCUSSION

Although this was a limited study looking at one specific trial project, we were quite impressed with the results obtained. The general acceptability and usage of the recordings was higher than anticipated.

The approach used for this trial study reduced the lecturer intervention to an absolute minimum. Implementing an effective publishing and distribution system could even further reduce this effort.

Given the small financial investment and limited additional effort, even a modest benefit to students would be enough to justify an institutional trial. In our opinion, the very high usefulness reported by students give this project sufficient ROI to defend further investigation and possible implementation.

We have noted that realities of the specific South African context did indeed warrant consideration. Using the Enhanced Podcasting model would appear to be the preferable option until internet bandwidth is more readily accessible. Focus should also be placed on developing podcasting solutions for use on traditional computer platforms, rather than focusing on mobile devices as is the trend in many developed nations.

The lecturers involved were relieved to see that students identified with recorded lectures as a support mechanism, rather than a substitute for traditional lectures. This feeling was not only explicitly reported in student feedback, but was also clear from the stable class attendance figures.

Students clearly used these recordings to revise work and prepare for examinations. The need for indexed recordings is apparent. In interviews with students most of the users of the podcasts indicated that they rarely watched the entire lecture, but rather focussed on the salient points or more advanced themes.

A sentiment that was stronger than expected was that students felt reduced stress levels due to the recordings acting as some kind of "safety net". This applied both to lectures students missed and to students fearing that they could not make notes of all-important issues discussed during lecture periods.

Educationally, the biggest advantage of using this technology is that it contributes towards the goal of letting different students progress at their individual pace. Providing a record that students can refer back to gives all students the opportunity to revise material when and where they want. It frees students to participate actively in class discussions rather than having to spend lectures frantically copying down pieces of information. Their role in the class thus changes from simply recording information to a more constructive one.

One of the main reasons for doing this research was to try and determine if podcasting would be an acceptable delivery mechanism to communicate content. Replacing some traditional lectures with video-only versions would open up valuable time on the timetable and venue roster. Although the technology appears to be easy enough for students to use and is generally accepted, it is important to note that the vast majority of students still prefer the traditional classroom experience. Shifting lectures to video would therefore require careful consideration, and mechanisms to retain the classroom feeling and interactive discussions facilitated by having all the students in the same room at the same time.

Although this model is not sufficient to be used as a lecture replacement, we also have to take note of the fact that students have different styles of learning (Kolb, 1984; Honey & Mumford, 1982; Honey & Mumford, 1983; Leite, Svinivki & Shi, 2009 and many others). While some students may benefit enormously from the classroom experience, others may prefer to work through material in the privacy of their own home. Although no notable impact on class attendance could be detected, one should not be dogmatic about trying to force students

to attend lectures if they do not benefit from them. Lectures should rather be used as interactive sessions that add enough value (in addition to other delivery modes such as video) that students find it worthwhile to attend the classes.

7. FURTHER RESEARCH

Before Enhanced Podcasting can be proposed as an institutional educational tool, more research is required.

In the first instance, a larger test group is required to validate the findings of this trial. This larger study should also include modules in the Natural Sciences and other disciplines with different teaching styles. Modules relying on chalkboard explanations or interactive demonstration may require different solutions where simple slide-and-audio recordings would not be sufficient.

Additional methods should be employed to gain richer information in the student usage of these recordings. Although Blackboard provided some very rough tracking statistics, more granular data is required to make informed conclusions.

This trial also suffers from a possible novelty effect. Student usage over prolonged periods of time will be needed to ascertain whether benefit from podcasting remains constant if it is no longer a "new and exciting" technology.

A mixed model using both lecture recording and pre-recorded presentations should be tested to investigate the possibilities of using this technology to address some of the resource constraints facing universities.

Our university is investigating video recording to help address some of the language issues facing students receiving instruction in a language other than their mother tongue. This study did provide some insight into the usage of podcasts for language support in the first year (not reported in this article), but further trials will have to be conducted to investigate these possibilities. This will have to include recording lectures in alternating languages in subsequent years and giving students access to past recordings.

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ⁱ On this point, it is quite important to note that the slides used are not lecture notes or summaries of the content of this module. They are presentation aids designed to help the lecturer communicate the argument to the class. Students are therefore encouraged to make their own notes, since relying on the slides would not be sufficient.

ⁱⁱ www.profcast.com

ⁱⁱⁱ If results are presented together it will be in the format (first years % ; third years %).

^{iv} When running a production system, rather than a trial, this should be solved by integrating a distribution system with Blackboard rather than manually uploading the files.

^v Validating these figures is recommended to try and quell concerns regarding over-reporting for many reasons.

^{vi} It should be noted that accurate class attendance measurement was not possible in every lecture. The anecdotal experience of the lecturer involved, however, corroborates these findings.