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# Using Mobile Technologies and Podcasts to Enhance Learning Experiences in Lecture-Based University Course Delivery

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**Abstract:** This paper describes a study that sought to explore the use of mobile technologies as a means to enhance the learning experience of students in a tertiary course of study. In particular the study involved the development of podcasting and vodcasting as an alternative to lecturing. Digital lectures were created to replicate the content usually presented in formal lectures. Students were able to access the lectures through such mobile devices as iPods and wireless enabled computers. The study sought to explore how students used these digital resources and the educational advantages that were achieved.

## Introduction

A common mode of delivery for courses in universities is the lecture format where course content and information is delivered through a teacher directed presentation to a large cohort. This is often followed by smaller tutorial and workshop activities where the large cohort is broken into much smaller units. Learning in these settings is typically measured through several forms, and the assessment regime often includes a formal examination. This delivery model provides considerable efficiency for course delivery but in many cases can provide uninspiring learning experiences and high levels of learner disengagement. The problem typically stems from the limited forms of presentation available in lectures, which regularly leads to a lack interactivity and limited ways to attract and engage learners (Bligh, 2000).

A number of researchers have sought to explore learning strategies that can improve the lecture format and have investigated strategies for facilitating interactivity and more active learning experiences (eg. Ramsden, 1992; Biggs, 2003). Recent advances in mobile technologies appear to provide other opportunities for creating more engaging learning experiences for subjects where lectures are a principal form of delivery (Fardon & Ludewig, 2000).

## The lecture as a learning strategy

While many consider lectures as an inferior and limiting delivery medium, the practice is still widely used among universities worldwide and is perhaps the most common and popular learning strategy among university teachers. Biggs (2003, p82) calls lecturing the “standard tertiary method”. When presented with the choice, many students will express a preference for the traditional lecture presentation over other forms of learning activity. For example, in a study undertaken in a large US university, when teachers offered their 700 students a choice of lectures or small group work or independent study, eighty six percent of the students chose lectures for their coursework (Baker, Bakshis and Tolone, 1974).

There are many reasons why lectures are still a popular learning and teaching activity in universities. They provide a very efficient teaching format. One teacher can often lecture to a class with many hundreds of students. From an administrative and economic perspective, this is a very appealing situation. The same lecturer, when supported by contemporary technologies, can also teach students in other locations. Universities often use videoconferencing technologies to deliver the lecture in real-time to cohorts in alternative locations. This delivery format can even provide real-time synchronous interactivity

to enable the lecturer to see and hear the students in the remote location as well as in the local classroom (Laurillard, 2002).

In the presentation of lectures, teachers can deal with a diversity of media and resource forms. The modern lecture theatre is typically equipped with a variety of contemporary resources including digital projection facilities, visual presenters and Internet connectivity. In science classes, for example, teachers can perform experiments which can be viewed on the large screens by all participants. In communications classes, teachers can include video footage, sound tracks and other forms of digital media. In technology classrooms, teachers can demonstrate software tools and applications. With the passage of time, lecture theatres in universities across the world are being refurbished and revamped to facilitate their on-going role as essential elements of program delivery.

### **Creating engaging lecture formats**

There are many writers, however, who argue that lectures are not a particularly effective means for supporting student learning. Biggs (2003) distinguishes between two forms of lecture, interactive and expository. As the terms suggest, they differ in terms of the level of learner engagement that they engender. When teachers use the lecture setting to present content and information to learners, the activity is usually quite didactic and lacking in its ability to engage learners. In recent years there have been a number of attempts to use technology to enhance learning experiences in large classes.

#### **a. Audience Response systems**

A popular strategy often used in lectures to create engaging settings involves the use of clickers, audience response systems (Draper & Brown, 2004). Audience response systems use infra-red or radio communications to enable responses from students to be aggregated and displayed in real time through overhead display systems. There have been a number of studies into the learning opportunities afforded by these systems and the advantages that have been reported include:

- heightened student interest and engagement created by interactivity through question and answer sessions in the large class;
- the facilitation of instant feedback enabling students to gain some sense of understanding and knowledge acquisition;
- being able to compare understandings with peers; and
- compulsory attendance of students because use of the clickers enables teachers to record the students' attendance.

Unfortunately there is a limited range of ways to use audience response systems and the positive impressions students can gain from their use can diminish with exposure making this device a strategy that needs to be used sparingly to help students to retain their interest and enthusiasm for the interactive sessions they support (Robertson, 2000). Most instructors (and students) who use audience response systems also dislike the amounts of time that this technology takes to set up and the need to consistently deal with technical problems.

#### **b. Groupwork**

Teachers can create opportunities for learner interactivity and engagement in lectures by providing opportunities for small group activities within the larger cohort. Learning activities of this form include jigsaws and buzz groups where students form into small groups to answer questions and challenges posed as part of the lecture delivery. More structured activities such as nominal group techniques require students to respond to questions in small groups and responses are aggregated and discussed to provide consensus in relation to lecture material. Teachers who attempt to include interactivity among learners in lecture settings, even with technology support, are often faced with management issues in attempting to keep students on task and interacting with the responses. These processes are made very difficult in large lecture halls where the logistics can limit most forms of group activity (Biggs, 2003).

#### **c. Mobile technologies**

With the proliferation of wireless technologies and laptop computers, it is possible now to create opportunities for interactions in large classes through computer-based learning activities. At Edith Cowan University, for example, we have been experimenting with Web-polling, the use of synchronous Web-based activities to provide opportunities for student interaction (Oliver, 2006). In much the same way as students use audience response systems, Web-polling enables students to respond in real time through

Web-based forms to questions posed by the lecturer to the class. Use of the overhead projection systems shows the Web page with the questions and responses, and after students have responded using their laptop computers, the refreshed screen can show the results. Unlike audience response systems where the scope and extent of the activities is limited, with laptop computers and wireless technologies, there are unlimited opportunities for forms of learner engagement to be applied in lecture settings to accompany the presentation of the course material and lecture content.

#### **d. problem-based learning**

Another learning strategy that has been used to provide more meaningful contexts for lecture presentations is problem-based learning. A number of studies have reported the use of problems and inquiry-based tasks as a means to engage learners (Ochoa & Robinson, 2005; Gijbels et al. 2005). In such settings students are given a problem or task and required to investigate its solution. The activity provides a meaningful context for learners to read and investigate the course material that would otherwise have been the subject of a lecture presentation. Through these means, the lecture can then become a session where the teacher can elaborate on the problem solutions and the students' understandings. This strategy typically requires alternative assessment modes and whilst it has been seen to provide engaging contexts for student learning, it does require marked changes to course delivery and assessment and is not likely to be a strategy that could be easily adopted by many teachers.

### **Student-centred learning activities**

One of the difficulties faced by teachers whose delivery formats use lecture-based modes is the teacher-directedness that such methods typically generate and encourage. In lectures, students usually have to wait for the teachers to initiate and prompt all forms of leaning activity. Research has demonstrated time and time again the advantages and opportunities that can stem from student-centred modes of learning. The question that we pondered was how to develop a student-centred form of learning for lecture-based learning and the extent to which students would welcome and willingly choose to participate. In the examples described above of strategies that have sought ways to engage learners in lecture settings, the solutions all typically retained a strong teacher-directed mode. With audience responses systems and mobile technologies, the various activities typically remain teacher-directed with little opportunity for learners to initiate and take ownership of the activity. Similarly, while the group and team activities provide opportunities for learners to interact and communicate with each other, they do so under the strict control of the teacher who continues to lead and manage the lecture learning setting.

With the use of the Web and courseware management systems, in recent years a number of researchers have described attempts to create more meaningful lecture formats through the provision of lecture notes and PowerPoint presentation materials online (Biggs, 2003). This flexibility has enabled students to review course materials ahead of lecture presentations and has provided opportunities for teachers to consider alternative formats to lecture presentations based on the fact that students have been exposed to course materials ahead of the lecture session. But this alternative does not fully provide for what many students see as critical elements of lecture representations, the teacher's voice.

Among the reasons given by students for the appeal of lectures as a learning strategy is the extra information that often comes from the presentation itself. Students can use lectures to gain some sense of the important elements in a lectures and the lecturer's personal stance, information that can be used to guide and inform their knowledge development. Lectures are often full of extra anecdotes and examples that are used to help exemplify and elaborate on materials. All these elaborations can be missed by students when the lecture content is presented online in the form of notes and PowerPoint slides (Goldstein & Benassi, 2006).

Recent technology advancements have yielded new possibilities for providing effective alternative learning strategies to support course delivery to large groups. There is now a wealth of opportunities for teachers seeking to create digital forms of their lectures (Sharma et. al., 2005). Digital lectures can take many forms depending on the richness of the information they contain. Digital lectures can be created in the form of sound tracks alone, or sound linked to Powerpoint slides, or video of the lecturer giving the lecture in a range of formats and file sizes (Fardon & Ludewig, 2000). Some lecturers take video of their lecture presentation and upload this so students who were unable to attend the lecture can use it for revision. In this

application, the resource does not alter the lecture presentation in any way but adds flexibility and opportunities for students to review the lecture after it has been delivered. With the rapid move to mobile technologies, there are now many different ways for teachers to create movies of lectures, and it was with these opportunities and capabilities in mind that we sought to explore the advantages that contemporary podcasts and vodcasts might offer our students.

### **Digital lectures as podcasts and vodcasts**

Digital lectures delivered through mobile technologies can be used to provide learning opportunities for lecture settings in ways which can potentially overcome the difficulties inherent in other strategies. This study sought to develop digital forms of lectures that could be accessed by learners, and which encouraged this access, ahead of the lecture presentation. The format of the resources was planned to include the elements in lecture presentations seen to be of particular value to students so that they would be encouraged to review these ahead of the lecture. In particular, the study planned to use podcasts and vodcasts, “digital recordings of a radio broadcasts and movies or similar programs, made available on the Internet for downloading to a personal audio player” (Wikipedia, 2006). Podcasts are audio files alone, while vodcasts include some form of visual element with the audio. What these technologies offer over other forms of digital lecture is accessibility through mobile technologies. An interactive classroom presentation was planned in place of the traditional lecture for each session in a semester long course, to enable students to explore the aspects of the lecture content and its application in more depth. The study sought to develop a learning strategy based on digital resources with a strong student-centred mode of learning, and to explore its implementation. Success in these endeavours could provide some support for teachers facing the age-old problem of a lack of engagement and interactivity in lectures through a solution that could be implemented relatively easily and effectively to improve teaching and learning in lecture settings.

### **Research questions**

In order to achieve these aims, we needed to explore a number of practical and technical features associated with the development and delivery of the digital media and then we needed to explore students’ responses to the learning settings and the level and forms of engagement that were encouraged. To that end we devised a study by which we could explore the following questions:

1. How successfully can digital lectures be developed in the form of podcasts and vodcasts?
2. How accessible do learners find the podcast digital lectures?
3. What are student preferences for listening to podcast digital lectures?
4. How do students prefer to access podcast lecture material?
5. How do students respond to this alternative form of delivery and learning?
6. How did students’ use of digital lectures influence their engagement in subsequent lectures? and
7. What strategies should guide a repetition of this learning strategy with another class?

### **Methodology**

A design-based research study was planned to explore the utility and efficacy of the planned approach (Reeves, Herrington & Oliver, 2005). Design-based research provides a very strong foundation for exploring effective uses of ICT in learning through its capacity to support a focus on broad-based problems. It does so through the integration of known and hypothetical design principles with technological affordances to render plausible solutions. Design-based research involves the application of theoretical solutions to solve real world problems through a process of rigorous and reflective inquiry used to test and refine innovative learning environments. Iterative processes are used to apply findings to subsequent interventions as a means to fully explore the learning settings.

### **Context of implementation and technology used**

The study was undertaken with a group of multimedia students in the final year of their university degree studying in a semester-long course where an important component of the course delivery was based on a lecture and a large part of the assessment based on a final examination. There were 25 students in the class and the students were all loaned a wireless enabled laptop and iPod to enable them flexible access to the digital resources and the capability for connectivity in the lecture room to facilitate remote interactivity.

An Apple Macintosh PowerBook G4 was used as the development platform to produce the podcasts and vodcasts. A number of different software applications were used to experiment with effectiveness, clarity

and ease of development. Microsoft PowerPoint provided the easiest and most direct method of simply recording the presentation, through the “Slide Show/Record Narration” option. This provides a user the option of recording audio (the lecturer’s voice) with the computer’s internal microphone or through a Bluetooth headset. The latter approach enables the lecturer to walk around while maintaining the quality of the audio recording, although the quality of the built in microphone is usually superior to the Bluetooth headset. Completed lectures were saved as movie files with a .MOV extension and using QuickTime were then easily converted into iPod format.

A disadvantage of using PowerPoint is that it doesn’t allow any interruptions to the flow of slides. If a teacher goes back one slide in a presentation, the last recording is lost. Teachers are also restricted to showing only PowerPoint slides with no other applications such as Excel, Word or a Web browser. However, using PowerPoint provides a quick solution for lectures, without the need to purchase any other software. Conversion from .PPT format (with the audio attached to each slide) to .MOV and then to .MV4 format that is ready for placing on the server, takes typically about 5 minutes.

ProfCast (<http://www.profcast.com/>) is a low cost solution for the Apple Macintosh which allows quick and easy creation of enhanced podcasts (chapter marks and pictures). Recorded sessions can be exported as an enhanced podcast, or edited with other software eg. GarageBand, with graphics, music, sound effects, and other editing features to produce a higher quality product. Exporting as an enhanced podcast is quick and easy, as no editing is involved and produces a file (.m4b) ready for placing on the server. Profcast supports a quicker development time than PowerPoint, as no file conversion is necessary.

Another application used in the study was Snapz Pro (<http://www.ambrosiasw.com/utilities/snapzprox/>). This application allows users to record anything on the screen. This is a highly versatile application, as lectures often include instructions on how to use an application, or demonstrate the usage of how to construct formula in Excel, MS Project, etc. Either the whole screen can be captured, or a defined area. It has many of the features of the popular application Camtasia, widely used with the Windows platform. When the recording session is complete, this application also produces a .MOV file, which then needs to be converted to iPod format using QuickTime. Again, this is not a time consuming process and takes only about 5 minutes to produce a vodcast, which is slightly larger in size than the previous enhanced podcasts produced by ProfCast and PowerPoint.

As an incentive to participate in the study, all students in the class were loaned an iBook Apple wireless enabled laptop together with a 30Gb iPod. Student feedback was obtained through an online questionnaire and a focus group interview. 22 students from the class of 25 completed the online questionnaire and a further 8 students volunteered to answer more detailed questions in a sixty minute focus group session.

## **Results**

### *1. How successfully can digital lectures be developed in the form of podcasts and vodcasts?*

The lecture presentation for this unit consisted of a 45-minute lecture, followed by a two-hour tutorial. Previously the lecture was a didactic presentation with minimal student interaction. The content was passed onto students from the text shown in the PowerPoint slides, along with the lecturer’s elaboration and clarifications.

In this study, both podcasts and vodcasts were produced to replicate the experience of the face-to-face lecture. The podcast (enhanced podcast), used voice synchronized over the PowerPoint slides. The first 4 lectures were produced in this quick and efficient manner. In making the recording, an introduction and conclusion were planned as well as a sequence for the slides to make the lecture more interesting. Some background music was included to make the presentation more appealing. Vodcasts were used when applications other than PowerPoint were to be used. Six movies were produced in this way that included animations demonstrating use of Excel, Explorer and MS Project, and the specific keystroke instructions involved. With the vodcasts, thought was given to the sequence of instructions, though again, it was quite a simple process to develop the vodcast. Once the podcast/vodcast files were produced, they were loaded onto a server, and accessed through an RSS file to enable subscription through iTunes, a web browser or RSS aggregator that automatically receive updates. The process of uploading podcast files onto the server was simple and quick, and took a few minutes.

The students indicated that they found both the podcasts and vodcasts informative and instructive. There was no apparent loss of information as a consequence of the altered presentation system. Students found the vodcasts clear and easy to follow, despite the small screen sizes, and appreciated the facility to be able to replay sections describing instructions on how using the software application. Students regarded this mode of presentation far superior to the conventional lecture situation, where there is only one opportunity to catch what is being demonstrated. On the other hand, students commented that they missed having the opportunity to ask questions.

### *2. How accessible do learners find the podcast digital lectures?*

Despite the fact that all the students were studying a course with a technology emphasis, and all had substantial experience with the Macintosh platform, it was found that many of these students found it difficult to successfully synchronize their iPods. Forty percent of the students in the study indicated that they had difficulty and could not easily organize their technology to facilitate the podcasting sessions.

Confusion occurred as a result of the laptops being configured with an older version of iTunes, the download software, and students didn't realize that this was the problem. Also, the laptops were using wireless technology to connect to the Internet, and the university firewall caused problems with downloading files. Students who had wireless connections at home didn't have a problem. For all the rest of the students, it was necessary to manually adjust the network preferences to get them connected. Also some students tried to synchronize the iPods to non-Apple PC's, which resulted in the iPods being reformatted.

These technical problems were very problematic at the beginning of the semester, and it was fortunate that the lecturer was able to quickly fix all of these problems. Otherwise, it was clear that the students may have very quickly lost interest in using the iPod technology to listen to lectures.

### *3. What are student preferences for listening to podcast digital lectures?*

Most students initially used the iPod mainly as an entertainment device for music, photos, videos and as a backup storage device. However, as the semester progressed and the novelty factor wore off, usage patterns changed and they used it more consistently as a "learning device". Some students also discovered useful podcasts were available for other academic units such as Japanese and Photography, and subscribed to useful podcasts.

Some interesting usage figures were noted:

- On average, students listened to ten of the lecture podcasts (out of 12) during the semester. Several students listened to only 5 in total due to time commitments and issues;
- All students listened to over five podcasts more than once. This pattern suggested a general appreciation of the opportunity to go over difficult lectures using the podcast technology.
- A number of the students listened to the podcasts many times to go over the content and to revise for the examination. The students appreciated the opportunity to go back over difficult lectures using the podcast technology and the vodcasts describing application use were the resources used most frequently in this way.
- Some extra podcasts were made to provide further information on assignment requirements, examination information and general feedback on assignment outcomes. All students indicated in their responses that they used these recordings as intended;
- All students used the iPod for some non-educational uses such as listening to music, storing photographs or as a back up memory device. This supported our beliefs that such devices would encourage and facilitate use out of hours;
- Few of the students explored using the technology for their own information purposes. Only six out of 21 students used the iPod to listen to other podcasts which was surprising given the large number of podcasts available for general use.

### *4. How do students prefer to access podcast lecture material?*

The survey results revealed half the students preferred to listen the Podcast lectures on the iPod, and the other half preferred to listen to them on the computer. The key reason for using the iPod was flexibility of

being able to listen to the lectures while driving, walking or doing housework. Students who preferred using the computer felt they concentrated better using a larger screen with QuickTime to see the podcast/vodcast (PowerPoint or screen grabs), while at the same time having the computer applications, books, and other notes available as reference. They felt this was a better learning experience, even though they had to sit at a desk.

The majority of students listened to each podcast in one straight session, as most of the podcasts were less than 30 minutes. A number of students mentioned how they made use of the markers (PowerPoint slide titles) that were inserted into the enhanced podcasts, to move between sections and pages and to locate their last position when sessions were interrupted. This enhanced podcast feature would be particularly useful for longer podcasts since students would often not be able to listen to these in one sitting. It became evident in the responses of the students that they appreciated features that provided them with flexibility and choice. The enhanced features did exactly this enabling lectures to be quickly scanned and important sections located and revisited with ease.

In this study, we chose to make the podcasts a consistent 30 minutes in length. The duration of the podcasts did seem to be a good length and encouraged students to listen through. Any longer, it was evident, students would have used the enhanced features a little earlier to skip and move between sections.

#### *5. How do students respond to this alternative form of delivery and learning?*

The majority of the students were very positive about this form of delivery. They indicated it was easier to understand the content, as they could review lectures at any time, at their own pace. This had wide approval from all the students, with typical comments given by many students as follows:

- *“The ability to re-watch a lecture with difficult concepts was very helpful to my learning”*
- *“Excellent for exam revision”*
- *“I was able to pause and rewind to listen again to important or difficult points”*
- *“I could watch them at my own time when I was most alert”*
- *“All lectures should be Podcast so students can review them for difficult concepts and exam revision”*
- *“I enjoyed the convenience, and the ability to listen to difficult lectures again”*

The quality of the 12 podcasts varied, as different software and different audio capture devices were used for production. Students were sensitive to the quality of the audio, and commented that in some weeks, the audio was mono, coming from only one earpiece, which they didn't enjoy. Most enjoyed having some appropriate background music, though a few found the background music distracting. Also, about half of the students found the iPod an excellent backup device for files and other media related to Multimedia project work. All students who responded to the questionnaire were very positive and appreciative of having access to podcasts. Several students commented that they would have preferred to have still had the formal lecture as they frequently were unable to do the pre-lecture activities the podcasts required. In such settings, the students who had not accessed the podcasts ahead of the lectures found the discussion and interaction in the lectures to be uncomfortable and less than useful because they did not have the necessary background to understand and contribute.

#### *6. How did listening to Podcast lectures before class influence students' engagement during the lecture?*

This was an interesting question to explore since the students appeared to change their minds during the semester as to how best they thought the lecture/tutorial should be run.

At the beginning of the semester the students all agreed that having access to the podcast before the lecture was an excellent idea, so that the class could have extra time in subsequent lecture settings to discuss more difficult concepts and examples. This worked well for the first six weeks of semester, when almost all of the students were listening to lecture before class, the interactive face-to-face class sessions were lively and the students' interactions appeared deeper than was evident previously with the traditional lecture. Students asked more questions about difficult concepts, or sought extended information. The lecturer showed more examples, and discussed these difficult concepts in greater detail.

However, after the mid-semester break, when students found themselves pressured in relation to assignment and other coursework requirements, their opinions changed. Many students indicated at this



point in time a desire to revert back to the standard in-class lecture format, coupled with a podcast delivered *after* the lecture. Tight time commitments prevented many students from listening to the podcasts prior to the class activities and as a consequence, it was difficult and inappropriate to spend class time discussing concepts that many had yet to be learning about due not their lack of preparation. At this stage in the study, we changed the strategy back to delivering traditional lectures as well as Podcasts. This appeared to provide the best scenario, as students were able to experience the face-to-face lecture, and to also have the opportunity to review the lecture later for difficult concepts or for exam revision.

There was much support for this use of the Podcasts in blended mode. Some typical comments included:

- *“I recommend that every tutor to introduce ipods and podcasts to other units. The technology might be high and a bit costly, but for the worth of improving learning at university level, the amount of money spent on that technology is only a fragment as i acknowledge studies as a gift to knowledge or better improving knowledge”*
- *“I think all classes should make use of this system”*
- *“Podcast/Vodcast learning material should become adapted by more units because its very useful especially if people cannot make a lecture, or missed some important points, came late or wish to revise the lecture. Thank you. You cannot underestimate the advantages this has given me. I am almost sorry to have to return the package. However, it has made me think rather seriously about trying to afford an iPod and laptop of my own”*

From our survey results, every student acknowledged podcasting as a useful strategy for reviewing lectures, but after the six weeks of semester, didn't like the pressure of having to listen to them before class.

#### *7. What strategies should guide a repetition of this learning strategy with another class?*

From this initial study a number of important issues and outcomes were identified that could guide future work with these technologies. The following areas appeared to be those that would need to be accommodated in future activities to more fully develop the use of podcasts as an effective instructional strategy:

- **An awareness of technology issues.** In this study, little heed was paid to potential technology problems and this caused many issues for the students. Technology needing to be considered and tested includes firewalls, versions of software, and location of usage for correct wireless settings. Technology that fails can quickly sink student motivation in the first few weeks of deployment if not correctly implemented;
- **Audio Quality.** Podcasts provide very high quality sound recordings and it was found to be important to adopt a consistent recording process to ensure consistency and quality in the recording. It is important to consider ambient sounds when making recordings and to ensure all podcast recordings are produced with same quality audio settings;
- **Flexible approaches.** In this study, the teacher changed the delivery format and did not present conventional lectures. This variation was a challenge for a number of the students who found themselves unable to engage with the resources ahead of the weekly sessions. The findings suggest a need for a teacher to use podcasts in a flexible fashion and to perhaps retain aspects of the formal lecture, for example to provide a summary of the content as a guide for students, rather than assuming all students were up to date with the prework. When students did not use the podcasts as became the pattern at the end of the semester, the interactive class sessions were not effective at all.
- **Pre-recording lectures.** Podcasts can be developed before the lecture or during the lecture. For optimal podcast quality, and student engagement, we found it better to develop the podcast before the lecture in a quiet room with a good audio capture device. This resulted in a well-scripted podcast that could be available for the students before the lecture. Recording in lectures creates may difficulties in terms of scripting and unintended interruptions etc.
- **Recording actual lectures.** In instances where it was not possible or sensible to record lectures ahead of the presentation, we found that by carefully scripting the lecture, and asking students to save their question until the end, it was possible to develop a good quality podcast in the classroom without duplicated effort.

## Summary and Conclusions

This paper has reported a study that explored the potential use of mobile technologies and podcasts as a means to enhance and improve the learning potential of courses delivered through lectures and large class presentations. The study found that contemporary technologies facilitate the development and delivery of podcasts and that teachers wishing to pursue this form of delivery would likely not face too many technical difficulties in doing so. At the same time, it was found that, once organized, students can also access and use these resources relatively easily.

In terms of enhancing learning, it was found that the resources can create opportunities for learners in the form of extra resources and materials to use in the acquisition and development of their skills and knowledge. In this study, use of the podcast was accompanied by an alternative delivery strategy which appeared to provide enhanced learning opportunities. The study found, however, that not all students preferred the alternative learning setting and many had difficulty coming to class with the required level of preparation. In the absence of the preparation, the effectiveness of the alternative delivery format was limited. The podcasts provided the learners with opportunities and choices and learners recognized the learning enhancements that could be gained. But many preferred to be able to make their own choices about how they might use the extra resources and through their actions they led the teacher to return to existing modes of delivery. The podcasts were seen as extra resources which were useful additions to the resource set but not necessarily appreciated as mandatory resources to be used at particular times.

The study found that podcasts can be very useful resources to provide options and choices for students. Podcasts were found to provide many advantages over other forms of digital lecture including ease of delivery and access. The question as to whether their use could lead to enhanced learning appeared to be dependent, not so much on the teachers' planned use of them, but more on the ways the learners elected to use them. This study serves to remind teachers that in the provision of student-centred learning environments, it is important to recognize the choices that learners need to make and to develop settings with learning designs that encourage learners to make choices on the basis of improved learning, more than convenience and comfort. We plan in future settings to further explore learning activities using podcasts to discover learning designs that can provide learner choices that encourage their participation in activities that will both, encourage and promote their learning.

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