Assessing the use of Video and Audio Podcasts in the Teaching and Learning of Computing: A Pilot Study

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Abstract

This report describes the findings of a trial project to investigate the production and use of audio and video podcasts to supplement and support lectures within the Department of Computing and Mathematics at Manchester Metropolitan University for the academic term 2006-7. This project involved action research and was intended to assess student attitudes to podcasting as well as assessing different approaches to producing a podcast. Podcasts were produced in a variety of formats and with different "quality" output to determine whether the students had any preferences over the type of material produced. The findings of this project show that all students who were surveyed had access to a device that could play back an audio podcast and that the majority thought that all lectures should be podcast on all courses. The students reported several reasons for using the podcasts and these included revision, catching up on a missed class and to aid understanding of lecture material.

Introduction

Podcasts have been available for entertainment for some time now. Educators have been experimenting with their first use. The term podcast first appeared around 2004 and was used to describe downloadable audio material that could be listened to on a portable MP3 player such as Apple's iPod series (Aliotta *et al*, 2007). For the purposes of this paper the term podcast is being used to refer to both audio and video files – though many commentators distinguish between these two and some use the alternative term "Netcast".

Podcasts have become widely available and accepted as a method of disseminating entertainment (such as radio programmes) and educational material (see for example iTunes U). There have been very rapid developments in networking and hardware technology over the last few years. Storage capacities for computers, MP3 players and mobile phones have increased dramatically and at the same time costs have fallen. This has led to a rapid adoption of devices capable of playing both audio and video files.

Developing Podcasts

There are a variety of approaches to developing educational podcasts (see Atkinson, Buntine and McCrohan, (2007) and Newman and Miller (2007) for examples). These vary from the capture of the "raw" audio of the lecture to full capture of all audio, computer output and video of the presenter.

Part of the remit of this project was to determine how difficult it would be to produce, edit and upload podcasts. To this end a range of approaches was used to record the lecture material. The various approaches were all centred on capturing "live" audio of a lecture.

Hardware and Software

A brief overview of the main methods used for this project is provided below.

The work for this project was conducted with an Apple iMac G5 computer running Mac OS X 10.4 using Audacity (which is free and available for Windows and Linux) ffMpegX (which is shareware and also available for Windows as ffMpeg) and the video editing software iMovie (which is Apple only, though Windows MovieMaker is free and equivalent in functionality).

An Olympus WS200 digital voice recorder was also used and a Sharp MD-SR50H minidisc recorder both used with a tie-clip style microphone.

The following approaches to podcast production were tested:

- Using the open source sound recording and editing software Audacity

- Using a digital voice recorder – in this case the Olympus WS200 that saves in Windows Media Audio (WMA) format.

- Using a minidisc recorder and converting the audio to a suitable digital format.

In addition to the range of techniques used the perceived quality of the recordings was also evaluated by varying a range of parameters. These included encoding the MP3 files into mono or stereo format, changing the bit rate of the original sampling (effectively lowering the quality) and using a tie clip microphone v. the microphone built-in to the device.

Recording into Audacity is a relatively straightforward process and there are a large number of tutorials available on the Internet to support this software. The most important issue with Audacity is to ensure that the software has been correctly set up before recording begins. Detailed instructions about how to do this are beyond the scope of this report but please see http://www.docm.mmu.ac.uk/STAFF/A.Waraich/Podcast_Workshop.html for further details of how to set up and use Audacity and some sample podcasts.

Minidisc based recording produced very high quality audio but had the disadvantage that the entire recording then had to be converted to a suitable digital format (this would take 50 minutes for a 50 minute recording). A newer version of minidisc named NetMD overcomes this problem and minidisc based recording in this format may be useful for very high quality output.

There are a number of potential issues with Audacity when recording software. The first is potential interference from the computer that is being used to record the audio – this is usually heard as a low "hum" or background "hiss". In most instances this is a minor issue and can be addressed but in some cases can be a significant problem. Secondly, if the "podcaster" is using a wired microphone to record material this will prevent free movement. If the presentation involves significant physical movement some other recording

method may be more suitable. Post-production issues were also logged to identify areas that might be problematic. The aim of this assessment was to produce guidelines and experiential data on how best to produce a podcast with the minimum extra work from the tutor.

All audio files were encoded as MP3 format as this is accessible by a wide range of devices from mobile phones and dedicated MP3 players to general-purpose computers. MP4 format video files were also produced which linked the audio to the PowerPoint slides that were used in presentations. In this case the audio was recorded in the lecture and then edited. The PowerPoint slides were exported as PNG format image files using the PowerPoint export function. Finally, the image files were then imported into video editing software (in this case Apple's iMovie) and the audio and image files were synchronised to produce a video. This was then exported as a video file (MP4) at 320 x 240 pixels suitable for display on a device with video playback facilities (such as the iPod video).

The Students

The podcasts were piloted with a group of final year students studying the unit 'Advanced Multimedia Authoring and Design'(MM3201). All students were taking degree courses in computing based subjects and so were familiar with computer technology. The result of the survey material below must be interpreted in the light of this.

All students had access to a device that could play back MP3 format audio, either as a portable device or as a laptop or desktop computer. Method

A range of podcasts was produced as outlined below. These were then assessed with the students to determine if there were any specific preferences for a type of podcast and its technical format (i.e. could they detect variations in quality?).

The following formats were used:

1. Raw audio capture of the lecture – posted without editing

2. Raw audio of the lecture with some post production to remove unwanted material and pauses

3. A five to ten minute audio summary of the lecture recorded by the lecturer outside of the lecture

4. A video file of the lecture audio linked to the PowerPoint slides.

Each of these formats was assessed by the students to determine whether they had any specific preferences for the podcasts and in what context they would use them. The information gathered covered the use of the podcasts as self reported by the students.

For each of podcasts produced the amount of time required to produce the material and edit it for upload to a server was also recorded (see Table 1)

Table 1: Audio formats used in the pilot

Podcast format	Editing and postproduction	Time required (average)
Raw audio capture	Convert to MP3; upload	~ 6 minutes
Raw audio - edited	Edit out unwanted sections; Convert to MP3; upload	~ 15-20 minutes
Audio summary (5-10 minutes)	Prepare script; Record; edit; upload	~ 20 minutes
Audio & linked slides	Convert audio to MP3; export PPT slides; edit in video editing software; export as MP4; upload	~ 20-25 minutes

Figure 1: devices used to access the podcasts

Which devices did you use to access the podcasts

95
57.5
40
10
0

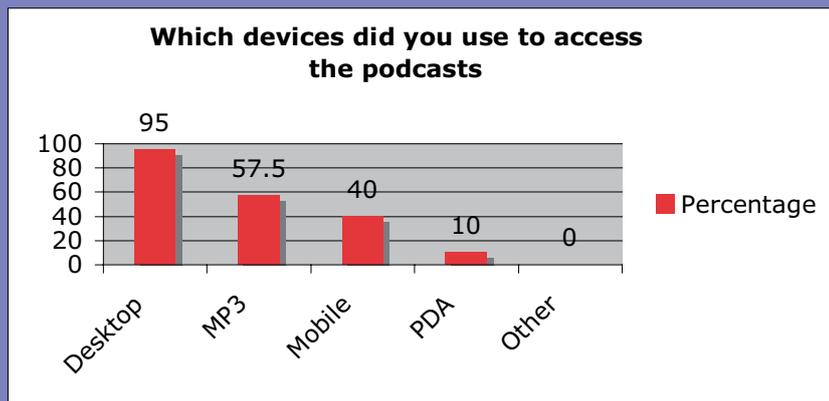■ Percentage

Desktop MP3 Mobile PDA Other

Figure 1 shows how the students accessed the podcast. The majority (95%) used a computer however, there were a significant number (58%) who used an MP3 player.

Figure 2: Did you take fewer notes because of the availability of podcasts?

Did you take less notes?

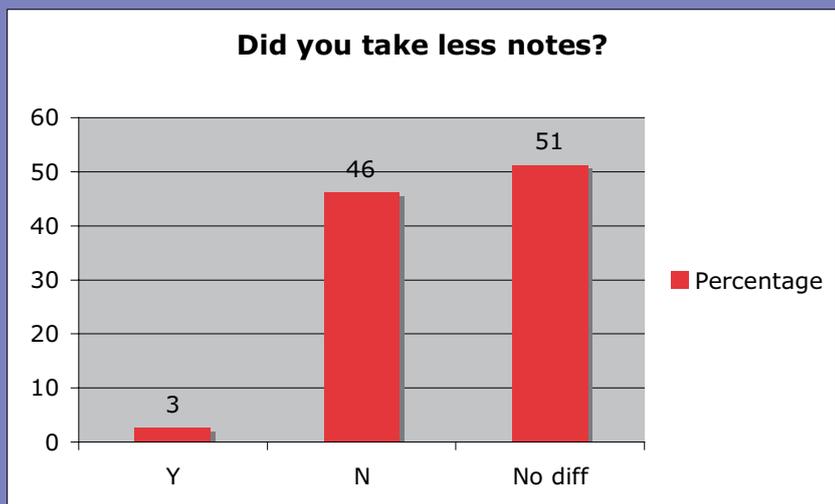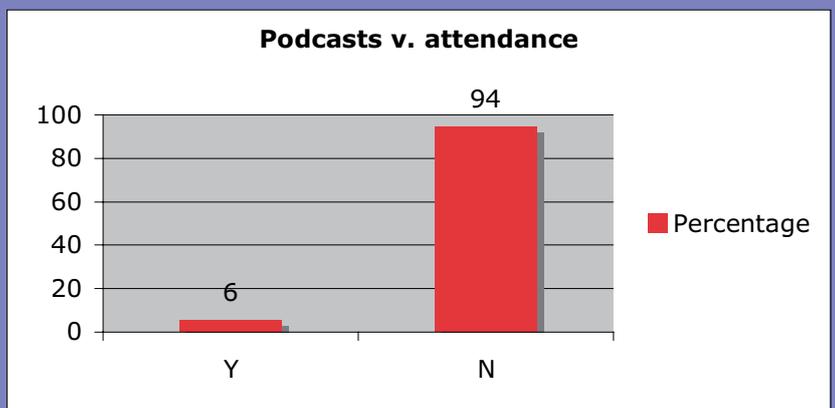51
46
3

■ Percentage

Y N No diff

Figure 2 shows that only 3% of students took less notes because of the availability of the podcasts.

Figure 3: Did the availability of podcasts affect your attendance?

Podcasts v. attendance

94
6

■ Percentage

Y N

Results

Data was gathered from 40 students: 73% were male and 27% female. All of the students in the sample owned a device that could playback MP3 audio and MP4 video files. The majority (95%) owned a desktop or laptop PC with this facility, 58% owned an MP3 player, 78% a mobile phone with these playback facilities and 8% a PDA (Personal Digital Assistant).

One concern voiced by some colleagues was that the availability of the podcasts would provide a disincentive to attend the lecture sessions. Direct comparison of the attendance for 2005-6 with 2006-7 shows little change in the attendance pattern and this was corroborated by the student questionnaire. Reponses on attitudes to attendance are shown in Figure 3. Only 6% of students indicated that the access to podcasts would make them less likely to attend.

Table 2, shows the students preferences for podcast type. There was a clear preference for the raw audio capture linked to slides and the partially edited audio, unedited capture of the lecture was next with the synopsis much less popular.

Table 2: Student preferences for the podcast types

Ranking	Podcast Type [1]
1	Audio linked to slides as MP4 video
2	Partially edited audio
3	Unedited raw audio capture
4	Synopsis of lecture 5-10 minutes

[1] Note: the first 3 were all very close; the synopsis was much less popular.

Interviews with the students after exposure to the podcasts indicated that some students were very enthusiastic about the podcasts and listened to them on their MP3 players whilst travelling to university or

Figure 4 Could podcasts be used as substitute for lectures?

Can podcasts be used as substitute lectures?
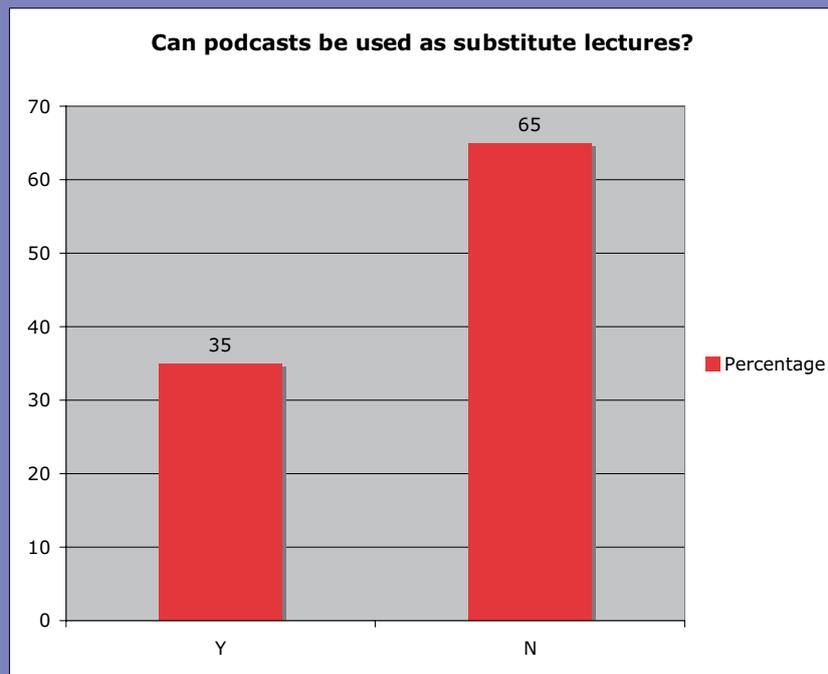
carrying out other tasks. Figure 4 shows the students' responses for the question "Could podcasts be used as a substitute for a lecture?". The majority (65%) believe that they could not be used in this manner, which indicates that students value lecture sessions.

When asked to rank how the podcasts were used, the most popular use was for revision, followed by catching up on a missed class though some students indicated they were using the podcasts to supplement their understanding of lecture material.

Conclusion

It is clear from this pilot study that students value podcasts as a useful supplement to lectures. This supports the findings of other similar studies (Newnham and Miller 2007). The results of this work indicate that access to podcasts has had minimal impact on student attendance. The majority of students did not believe that podcasts were suitable substitutes for face-to-face lectures, which supports this assertion. After using the podcasts for one term on unit MM3201 the students indicated that podcasts should be

made available for all lectures across all units. The aural quality of the podcast was not an issue for the students at all; it is clear that they are willing to accept a raw audio capture and are not concerned about the occasional cough or digression – some students expressed a preference for a capture of the whole audio compared to an edited version of the same lecture. This is significant as there is a much lower overhead in terms of time and effort in post-production and editing for the producer of the podcast.

Recommendations

From this pilot study it is clear that there is student demand for podcasts of lectures for a range of reasons. The use of a digital voice recorder allows the possibility of producing audio podcasts of lectures with minimal overhead for the lecturer. Unedited audio is perfectly acceptable to students who can then review the lecture in conjunction with the original lecture slides. It is also evident from this study that the perceived quality of the podcast is not an issue for the vast majority of students. Mono output at a relatively low encoding is perfectly acceptable. Overall, recording

of a lecture and direct upload of the material is a viable model for podcasting. It is suggested that a "pool" of voice recorders be made available to potential podcasters and that a centralised server needs to be available to host material (podcast audio files are typically around 30 MB for a 50 minute lecture if MP3 format is used). The author has produced a series of general guidelines on producing podcasts and links to material on using Audacity and other recording and editing tools this can be found at: http://www.docm.mmu.ac.uk/STAFF/A.Waraich/Podcast_Workshop.html.

References

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Acknowledgements