

Perpetual connectivity: Lecture recordings and portable media players



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Using portable media players to enhance and support teaching and learning activities in higher education is becoming an increasingly common practice. With a growing understanding of the pedagogical possibilities of podcasting, the availability of low-cost MP3 players and the arrival of convenient delivery environments such as Apple's *iTunes U*, many universities are considering how to appropriately harness this technology to support their teaching priorities and the learning needs of their students.

One of the most popular current uses of portable media players for educational purposes centres around the practice of recording and disseminating lectures. Through enabling students to use portable media players to store and playback digital copies of lectures, the intention is to make the lecture format more accessible for students and support student mobility and flexibility in their learning activities. This paper looks at student use of portable media players for accessing lecture recordings and evaluates some of the associated practical and pedagogical implications.

Keywords: lecture recordings, portable media players, mobile learning, accessibility

Background information

Portable media players and higher education

The use of portable media players in higher education is a matter of considerable discussion at present on a international scale, not only in universities where administrators, lecturers and students are hotly debating the pedagogical issues, but also in the international media. A wide range of statements have been made about the use of these players in education by educators and journalists, ranging from "The iPod isn't just changing the way students take notes – it's turning college into a realm of perpetual connectivity" (Moore, 2005) and "thanks to the iPod and other digital music players, higher education is becoming as portable as a pop song" (Austin, 2007) to "Podcasting has emerged as the latest innovation in university classroom teaching" (Alexander, 2006) and "it's going to change higher education" (Blythe, 2006).

One of the key findings from Kvavik and Caruso's 2005 report into undergraduate students and information technology stated that "Information technology in the higher education experience adds convenience, connection, and control for students" (Kvavik and Caruso, 2005). In recent years, the use of educational technologies to enhance the flexibility of and accessibility to learning materials has been widely acknowledged as being beneficial for students, particularly in terms of freeing them "from the need to be in a particular place at a particular time" (Bell, Cockburn, McKenzie and Vargo, 2001). The advent of the iPod and other portable media players seems to offer significant opportunities to extend this sense of convenience, connection and control, with the aim of better supporting and augmenting student learning practices.

Duke University's high-profile iPod project, commencing in 2004, contributed significantly to putting the issue of teaching and learning with portable media players on the higher education agenda, both nationally and internationally. The final evaluation project report listed five major academic uses of the iPod, which included disseminating course content and recording activities inside and outside the classroom; the reported benefits of using portable media players in teaching and learning included aspects relating to convenience, accessibility and flexibility (Belanger, 2005). And Duke University is by no means the only university investing substantial resources and undertaking these activities on a large-scale: the University of California Berkeley, Purdue University, the University of Washington and the University of Western Australia were all early front-runners in this field, to name only a few.

Recording lectures

The role and effectiveness of the lecture in higher education is a highly debated topic; the traditional lecture method has been accused of “not fulfilling the learning potential of typical students today” (McNeely, 2005) but it has also been identified as accomplishing “important and valuable purposes” (Ayers, 2002). Whilst this debate between its critics and supporters continues, the lecture method remains a standard teaching practice in most higher education institutions around the world. The challenge becomes how to make this teaching practice as effective as possible, informed by an awareness of its limitations and its more positive attributes.

A common approach to making a lecture more accessible and effective for students is to record it (Biggs, 2003; Bligh, 1972; Laurillard, 1993). The practice of recording lectures aids revision and comprehension by enabling students to return to the lecture content for review, after the lecture has been given. In accessing lecture recordings, students are able to view the lecture’s content and materials at their own pace, pausing and rewinding as necessary. This resource is highly beneficial for many members of the student body, including those with disabilities and work or family commitments. It also helps students who have to overcome language barriers, and assists in managing timetable clashes (Williams and Fardon, 2005).

Unless delivering lectures to students in remote and regional areas, most universities who have introduced a lecture recording service have done so to support and enhance the lecture method for students – not to replace the face-to-face lecture. Attendance by students at lectures is usually still expected or demanded. As such, it is a resource that is intended to supplement not substitute (Harley, Henke, Lawrence, McMartin, Maher, Gawlik and Muller, 2003), to be used for on-demand revision purposes rather than replacement purposes.

Project introduction and overview

Higher education practitioners are increasingly being alerted to differences in characteristics of students belonging to the Net Generation, also known as Digital Natives or Generation Y, and previous cohorts of students. In his 2001 seminal paper on Digital Natives, Prensky identifies Net Generation students as growing up

on the “twitch speed” of video games and MTV. They are used to the instantaneity of hypertext, downloaded music, phones in their pockets, a library on their laptops, beamed messages and instant messaging. They’ve been networked most or all of their lives (Prensky, 2001).

It has been argued that this familiarity and confidence with online media and networked environments has fostered multitasking skills and active learning preferences; as a result, educators need to evaluate and reconsider their approaches to teaching to ensure that student learning needs continue to be suitably accommodated (McNeely, 2005; Oblinger and Oblinger, 2005). The growing use of educational technologies and IT in general in university teaching and learning is in many ways tied to an awareness of ascribed Net Generation characteristics and preferences for mobility, accessibility and online communications (Brown, 2005).

However, it has also been observed that the number of Net Generation students currently enrolled as undergraduates in higher education in the US may only represent about a quarter of the total enrollment numbers, with the other three quarters made up of ‘non-traditional’ students who most likely do not belong to this group:

Approximately 25 percent of the students enrolled in postsecondary education are traditional students pursuing traditional pathways and traditional goals. Traditional students enter college immediately after graduation from high school, attend full time, usually work only part time, and are financially dependent on their families. Nontraditional students may differ on a number of characteristics, such as entering postsecondary education as an adult student, attending part time, working full time while enrolled, or being financially independent (Ramaley and Zia, 2005).

Accordingly, as has been the case over previous decades, no undergraduate student cohort is easily definable in demographic terms or characteristics – and, as a result, a ‘one size fits all’ approach to teaching and learning will rarely be successful. It is important to recognise that student learning styles and

preferences vary and that closely aligning teaching practices with stereotypical Net Generation characteristics is unlikely to effectively support the whole student population; instead, efforts should be focused on working towards making all teaching and learning activities as flexible and accessible as possible for both 'traditional' and 'non-traditional' groups of students.

Recording face-to-face lectures for students to access online for revision and review purposes is an example of such an approach. The face-to-face lecture is often viewed as a fairly inflexible and inaccessible form of teaching for many students: for example students with disabilities, members of the Net Generation who are unused to and uninspired by this mode of delivery, and those with work or family commitments. Recording lectures and providing them to students in digital format enhances the flexibility of the lecture. As noted by McElroy and Blount in their recent study of student use of recorded lectures,

Students have complex lives and need to make choices about the most appropriate use of their time ... Students should be able to choose the most appropriate mode of learning for them and sometimes this will be face-to-face lectures and at other times it may be listening to a lecture on an iPod while doing something else (McElroy and Blount, 2006).

A significant number of institutions internationally have undertaken small- or large-scale lecture recording activities for many years, sometimes recording lectures manually onto audio or video cassette and depositing them in a central library, or recording them digitally for publication online via streaming formats. Although providing the lecture in this format does extend flexibility, allowing students to have access to the lecture material after the completion of the face-to-face lecture, it still requires them to be tied to a certain location whilst listening or watching the recorded lecture – either in the library or at a computer. The introduction of digital lecture recordings in download and podcast formats and the prevalence of portable media players on campus has made lecture recordings even more flexible and accessible, freeing students from these location constraints. As observed by Read,

Students might not take the time to listen to course recordings if they have to sit at a computer (or, worse yet, a library carrel) to do so ... But give them the option of reviewing while they are doing laundry or waiting for a bus, and they might just take you up on it (Read, 2005).

At the University of Western Australia (UWA), the practice of recording lectures for publication to students online commenced in 1999 and is now firmly embedded in the university's teaching and learning framework. In 2006, using the Lectopia automated lecture recording system installed into 51 lecture theatres, 425 lectures per week were recorded receiving an average of over 10,000 hits per week. Up until 2004, the recordings were made available to students in streaming formats only. During 2004, the capacity to make recordings downloadable to portable media players and mobile phones was introduced; in 2005, full podcasting integration was released.

Initially some UWA lecturers were reluctant to make their lecture recordings available to students for download and podcasting due to their concerns about intellectual property rights and adherence to copyright compliance, preferring to provide recordings in streaming format only. However, as numerous studies have found, the proportion of undergraduate students who own portable media players is high and increasing (Kennedy, Krause, Judd, Churchward and Gray, 2006; LeClaire, 2006) – and the opportunity to widen access to lecture materials for students through disseminating recordings via download and podcasting for playback on these players is proving tempting to many lecturers at UWA. In 2007 at UWA, as lecturers are becoming more familiar with podcasting and associated technologies and tools, all lecture recordings continue to be made available to students in streamed formats, but now 77% of these recordings also being provided for in download formats and 65% as podcasts.

Since introducing download and podcast lecture recording formats at UWA, no research has been undertaken into the impact that this increased flexibility and accessibility has effected in terms of the use of portable media players. Anecdotally, students appear to welcome the choice that they have been afforded by this change whilst lecturers seem relatively unaffected. The purpose of this project was to find out more about how and why students are using portable media players to listen to and/or watch lecture recordings.

The project was conducted during second semester 2006 at UWA and involved the application of quantitative and qualitative research methods, centred around a major student survey and a series of student focus groups. An anonymous, online student survey was carried out over a three-week period (28 August to 15 September 2006). All students who accessed lecture recordings during the survey period had

the opportunity to complete the survey and a total of 1,074 responses were received; due to the way in which the survey was published, note that data was not gathered from students who do not use lecture recordings.

The survey itself sought to gather feedback from students on a wide range of different topics and issues relating to recorded lectures, including:

- General demographic and study information.
- Preferred recording formats and recording types.
- Frequency of attending lectures and frequency of accessing recordings.
- Reasons for using lecture recordings; comments on the practice and value of lecture recordings.
- Ownership of portable media player.

The student focus groups were held during October 2006. Although a number of different issues were discussed at these groups, such as attendance at lectures and the use of recordings by students with disabilities, the use of portable media players to access lecture recordings was also debated. Together with the student survey and the focus groups, additional sources of information were used to inform the project such as system statistics and logs that were extracted from the Lectopia system.

Project results

As part of the 2006 UWA lecture recording campus-wide student survey, the following question was asked: "Do you own a portable media player that you use to store and playback lecture recordings?". In response, out of the total of 1,074 survey responses received during the specified three-week period, 413 students indicated "Yes" (they used portable media players to store/playback lecture recordings), 657 said "No" (they stored/played recordings on a computer and did not use a portable media player) and 4 did not enter a response. It should be noted that the survey responses for the four students who did not submit an answer to this question have not been included in the project results reported below, making the total sample size 1,070.

Students who used a portable media player to store and playback lecture recordings were requested to indicate the type of player they used (shown in Table 1). The standard iPod (capable of playing audio-only material, without video) was the most common portable media player on campus by some distance, with other brand audio-only MP3 players also being popular. Note that students were permitted to indicate more than one portable media player type if appropriate.

Table 1: Type of portable media player used by UWA students to store and playback recordings

Portable players	Total	iPod	iPod Video	Cell phone	PDA	PSP	MP3 player	Other
Uses portable player	38.6%	59.1%	16.6%	9.0%	5.3%	1.9%	33.7%	5.8%
Does not use portable player	61.4%	-	-	-	-	-	-	-

The demographic information extracted from the survey results revealed that male UWA students were more likely than females to use portable media players for accessing lecture recordings (shown in Table 2, results given in percentages with actual student numbers provided alongside in brackets). UWA students whose native language was not English were slightly more likely to own a portable media player than native English speaking students (41.2% compared with 38.1%). Use of portable media players by age did not significantly vary from the campus-wide averages for the 16-20, 21-25 and 30+ age groups (shown in Table 3). Survey respondents in the 26-30 age group indicated a higher proportion of portable media player use than other age groups, but the total survey size for this group was only small (29 students) and this result is therefore perhaps unreliable.

Table 2: UWA students who use portable media players to store and playback recordings by gender

Sex	Total	Female	Male	Other/No response
Uses portable player	38.6%	34.3% (230)	45.9% (181)	33% (2)
Does not use portable player	61.4%	65.7% (440)	54.1% (213)	67% (4)
Campus-wide average	100%	62.6%	36.8%	0.6%

Table 3: UWA students who use portable media players to store and playback recordings by age

Age	Total	16-20	21-25	26-30	30+
Uses portable player	38.6%	38.0% (250)	39.5% (130)	51.7% (15)	33.3% (18)
Does not use portable player	61.4%	62.0% (408)	60.5% (199)	48.3% (14)	66.7% (36)
Campus-wide average	100%	61.5%	30.7%	2.7%	5.1%

At UWA in 2007, all recordings are made available in streaming formats, 77% are available for download as well, and 65% as podcasts. Unsurprisingly, the survey results showed that download and podcast formats of lecture recordings were considerably more popular with students who used portable media players to store and playback lecture recordings than those who do not (shown in Table 4), although interestingly the preference for podcasted lectures was not very high for either group of students whereas streaming was strong for both. This data may, however, be unreliable – the survey period occurred in mid-semester and most students who subscribed to their lecture recording podcasts at the start of semester may therefore not have seen the link to the survey, and not gathering data from this group of students could have a significant affect on the results for podcast popularity. Note that students were permitted to indicate more than one recording format preference if appropriate.

Table 4: Recording format preferences of UWA students

Recording formats	Total	Streaming	Download	Podcast	No preference
Uses portable player	38.6%	36.8% (152)	68.8% (284)	17.9% (74)	7.0% (29)
Does not use portable player	61.4%	58.3% (383)	43.1% (283)	3.2% (21)	14.8% (97)
Campus-wide average	100%	50.0%	53.0%	8.9%	11.8%

Preferences for different recording types (audio-only, audio and screen capture, audio and document camera, audio and talking-head video) were not significantly affected by whether or not students used a portable media player to listen to or watch lecture recordings.

From the survey responses, UWA students who used portable media players for lecture recordings were slightly more likely to ‘always’ attend face-to-face lecture recordings than those who did not (shown in Table 5); they were also slightly more likely to ‘always’ listen to lecture recordings (shown in Table 6). Students with portable media players were less likely to access recordings from home (71.7% compared with 75.9%) and more likely to access recordings on campus (26.4% compared with 22.9%).

Table 5: Attendance at face-to-face lectures by UWA students

Lecture attendance	Total	Always	Regularly	Occasionally	Never
Uses portable player	38.6%	27.4% (113)	54.2% (224)	14.3% (59)	4.1% (17)
Does not use portable player	61.4%	22.3% (146)	56.0% (366)	16.4% (107)	5.3% (35)
Campus-wide average	100%	24.4%	55.2%	15.7%	4.7%

Table 6: Frequency of use of lecture recordings by UWA students

Use recordings	Total	Always	Regularly	Occasionally
Uses portable player	38.6%	24.0% (99)	47.5% (196)	28.5% (118)
Does not use portable player	61.4%	22.1% (145)	47.6% (313)	30.3% (199)
Campus-wide average	100%	22.8%	47.6%	29.6%

Students completing the 2006 UWA student survey were asked to indicate the reasons why they listen to lecture recordings. The most common reasons articulated are presented in Table 7 (students were permitted to indicate one or more reasons in their survey response if appropriate). Revision and concept review were the most popular reasons for accessing lecture recordings for all students responding to the survey, although this reason for use was higher for students who use portable media players to access recordings than those who do not. The other main reasons for using lecture recordings (timetable/schedule clash, work and/or family commitments, preference for recordings over face-to-face lectures, and disability) did not register significant differences between students who do or do not use portable media players.

Table 7: Reasons for using lecture recordings by UWA students

Using recordings	Total	Revision and review	Timetable clash	Work and family	Prefer recordings	Disability
Uses portable player	38.6%	75.8% (313)	48.9% (202)	42.8% (177)	28.1% (116)	2.7% (11)
Does not use portable player	61.4%	67.9% (446)	46.3% (304)	43.8% (288)	27.4% (180)	1.7% (11)
Campus-wide average	100%	71.0%	47.3%	43.4%	27.7%	2.1%

The final section of the student survey gave students the opportunity to provide feedback or make comments regarding the teaching and learning practice of recording lectures for university students, as well as suggestions for change from technology and pedagogical perspectives. The most common response received from students irrespective of whether or not they used portable media players was that all lectures should be recorded, with a considerable number of students suggesting that recording lectures should be mandated across the whole campus. Of the comments made by students who use portable media players to store and playback their lecture recordings, the majority fell into two main groups categories: convenience and mobility/multi-tasking. A handful of these comments are provided here as a sample of those received.

Comments on convenience, focusing on the benefits of providing lectures via podcasting and for download:

- make all units podcastable. very tedious having to download all the different ones, when it can be easier
- it is so convenient - especially with podcasting - that I don't know what I would do without it.
- I no longer have the internet at home which is a huge adjustment (!) and I find it very useful being able to take lectures home to listen to
- The only suggestion I have is to make all lectures downloadable rather than streamed – i like saving the lectures on my laptop for later use when I'm not connected to the net.
- it would be good if all lecture recordings could be downloaded (offline use)

Comments on mobility and multi-tasking, focusing on lifestyle flexibility and time management:

- The ability to download lectures to media devices such as ipods means that I can listen to lectures on the bus.
- In this world where time is becoming more precious and coveted, a mobile form of the lecture allows me to multi-task by reviewing the lecture and reinforcing the concepts presented while on the bus, driving my car, eating my lunch, between other lectures, etc.
- enables me to study while on the go – while driving, doing housework and just before falling asleep!! Very handy.
- I travel far to uni so i can listen to lectures on my ipod on the train so travelling isn't such a waster of time now
- a great way review material whilst in transit, or at the gym etc.

Considerations and conclusions

When analysing the results from the 2006 UWA lecture recording student survey to determine how and why students are using portable media players to listen to and/or watch lecture recordings, it quickly became clear that in most instances there was little difference in the responses between students who use portable media players to store and playback lectures and those who do not. More male students have portable media players than female, this group of students are slightly more likely than others to use the lecture recordings for revision and reviewing concepts, and they have higher preferences for download and podcast recording formats – but apart from that, the results between the two groups are very similar. Data relating to attendance at face-to-face lectures between the two groups bore close comparison, as did the results on the frequency of using lecture recordings by students.

There were, however, a number of points of interest that arose from the survey with regards to portable media players. For example, it had been expected that the preference for the podcast recording format would have been high amongst students who use portable media players but in fact only 74 of these students (17.9%) selected this format as a preference compared with the 284 (68.8%) who opted for download as a preference. Notably, streaming was a more popular format (36.8% or 152 students) than podcasting for these students. This could be partly due to the fact that all recordings are available for streaming whilst only 65% are available as podcasts but this result was nonetheless unexpected. It seems

that the convenience subscribing to a podcast over downloading the individual lectures required is not critical for many UWA students with portable media players.

That said, the results did confirm that a high proportion of UWA students prefer download to streaming or podcasting when it comes to recording formats (53% overall). This was particularly the case for students with portable media players. The flexibility that download formats provide in terms of mobility and multi-tasking was specifically highlighted by many in the comments section, referring to long travelling times and the ability to study while in transit. From a convenience perspective, it also freed students from the need to be connected to the internet whilst listening to lectures, unlike streaming, which was an important factor for a number of survey respondents.

Surveys of students and podcasting that have been conducted at other universities have reported interesting findings relating to lecture recordings and mobility. In Lane's study of podcasting at the University of Washington, for example, she reports that "A strong majority of students—87% of all respondents—reported listening to course podcasts on a computer, rather than an MP3 player ... This pattern indicates that despite news coverage of students listening to Oceanography lectures "in the gym," mobility did not appear to be the driving factor behind most students' use of course podcasts" (Lane, 2006; quoting Frey, 2005). Lane goes on to say that "our speculation that students listened to the podcasts on computers, rather than MP3 players, because they were simultaneously accessing other resources" (Lane, 2006). Other studies have endorsed this, finding that students prefer listening to podcasts on their computers rather than on portable media players (for example, Lee, Chan and McLoughlin, 2006).

Conversely, using portable media players to store and playback recordings seemed to be important to a reasonably high proportion of UWA students for mobility reasons. Many mentioned listening to lectures on the bus or in the car, noting the benefits of flexibility that download and podcast formats afforded in their learning. This difference between the results from the universities such as the University of Washington and those from UWA could perhaps be attributed to the nature of the two universities. UWA is very much a commuter university where most students live off-campus, usually at home, and often have to travel for 30 minutes or more to get to the campus. This may be the reason why more UWA students strongly value mobility in accessing their lecture recordings.

Another interesting matter that arose in the survey results related to student expectations. From the comments made by almost all students in the feedback section of the survey, it was apparent that students highly value the lecture recording service provided by UWA; over 99% of students identified the service as either 'Essential' or 'Useful' to their learning. Many felt that recording lectures, and making them available in all format types, should be mandatory; some referred to direct relationship between the provision of services such as lecture recording and their tutorial fees. For example, "i believe the recordings are good value, if we pay the fees, then we should be able to receive the education under difficult circumstances" and "Have ALL lectures recorded with both video and audio recordings. This should be enforced as it's very silly to see the lecture theatres that are wired up for video and audio recordings not being used ... Our tuition fees paid for these and must therefore be fully utilised". As noted by Wager, "The Net Generation expects good customer service ... In a very practical way, students want to see a relationship between the cost of their education and the delivery of quality services" (Wager, 2005). This is true not only for the Net Generation but most students at UWA. Making lecture recordings available to students in a range of formats to support student demand for flexibility and choice is vital to meet student expectations.

Although this project has begun the process of understanding how and why students at UWA access lecture recordings on their portable media players, it has also highlighted some issues that remain unanswered which will be considered in subsequent projects. These include: the socio-economic factors that can influence this type of activity; the impact of subscribing to lecture recording podcasts on download quotas and speeds; the appropriateness of lecture podcasts for specific portable media players in terms of font sizes and readability; differences between standard podcasts and enhanced podcasts.

So, does a portable media player really turn college into "a realm of perpetual connectivity" and make education "as portable as a pop song"? The results from this project suggest that, for a significant group of UWA students (albeit a minority, almost 40%), the answer has to be that it does. The flexibility afforded to students who choose to store and playback lecture recordings on portable media players was strongly confirmed through the project's results. Specifically students identified portable media players as offering significant benefits in terms of convenience, mobility and multi-tasking. Although the reasons *why* students with portable media players use of lecture recordings does not significantly vary from those who do not, *how* they use them can be quite different with reports of students listening to or watching

lecture recordings in transit or whilst undertaking other activities quite common. One can only speculate whether this type of use will expand or decline in the coming months and years; what is certain is that portable media players are already playing a valuable role in supporting student learning at UWA and in many universities internationally.

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Please cite as: Williams, J. & Fardon, M. (2007). Perpetual connectivity: Lecture recordings and portable media players. In *ICT: Providing choices for learners and learning. Proceedings ascilite Singapore 2007*. <https://doi.org/10.65106/apubs.2007.2583>

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