THE VIRTUAL PEDAGOGY INITIATIVE
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Summary

Contemporary Higher Education Institutions must adapt to address government funded calls for expansion and widened participation. The adoption of e-learning strategies, such as the use of the podcasts, can facilitate flexible learning around the needs and expectations of students. In this article we outline a number of e-learning developments at Aston University collectively referred to as the *Virtual Pedagogy Initiative.* Each of the strands, podcasts, vodcasts, mobile telephony and the campus wide remote broadcasts, are described pedagogically as well as technically. Where possible data highlighting the student response and experience are included. The article begins with the contention that contemporary undergraduates may be qualitatively different and can considered 'digital natives'.

General Background

In 1998 the Carnegie Foundation for the Advancement of Teaching in the US commissioned an investigation into the current state of undergraduate teaching in America. This investigation and the subsequent report was headed up by the then President of the Carnegie Foundation, Professor Ernest Boyer. Boyer was charged with examining the state of undergraduate research education and to *'confront the nation's colleges and universities to break out of the tired old teaching versus research debate and define, in more creative ways, what it means to be a scholar*' (Boyer, 1997, p1). The results of the subsequent five-year investigation into the efficacy of inquiry-based education have influenced US higher education in a number of ways.

The report maintained that prior to 1997 undergraduate enquiry-based training was practically non-existent. Furthermore for higher education to deliver authentic learning universities would need '…*to be able to give their students a dimension of experience and capability they cannot get in any other setting…* ' (Boyer, 1997, p 27). Boyer was primarily concerned with the research led universities that considered their research infrastructure as a primary concern. It was felt that some students at these institutions left without actually seeing research staff or experiencing the research that the universities prided themselves upon. There was not a symbiotic relationship in which undergraduates invigorated research agendas and in return receiving training in research skills. Boyer argued that it was imperative that members of staff do not become '…*tenured drones who deliver set lectures from yellowed notes, making no effort to engage the bored minds of the students in front of them…'* (Boyer, 1997, p. 5).

The Boyer report provided a ten point agenda for change, which can facilitate the development of this symbiosis between research staff and students. Of this 'new model' the current article is concerned with the first four points, and these are:

1. **Remove all barriers to an interdisciplinary education.** Scientific enquiry is becoming more and more interdisciplinary. A proficient graduate would need the skill set to be able draw upon many different, but convergent, techniques and disciplines.
2. **Develop communication skills at every opportunity**. The Boyer commission realised the importance of strong and professional communication skills to the competent graduate.

3. **Use information technology creatively**. Undergraduate students should use (and also be exposed) to creative use of technological advancements. Competent graduates need more than just a working knowledge of standard software packages.
4. **Cultivate a sense of community.** To engage fully with any initiative it was of vital importance that a sense of community be develop from the very first stages of the graduates career.

As it challenged the existing educational orthodoxy the Boyer report was initially greeted with controversy and debate. Even so the report did have an immense impact on higher education in America. The year after Boyer' publication an opinion article on the potential impact the report would have was published in the *Chronicle of Higher Education.* Here it was noted that '*Institutions are having a hard time placing PhD students in academic jobs and are now being forced* [our underline] *to pay more attention to…undergraduates'* (Wilson, 1998 p. 12). However, the same article also reports that '*conditions have improved for universities… perceived pressures… with undergraduates have lessened a bit'* (Wilson, 1998 p. 12). This article concludes with a statement by Ernest Boyer's predecessor, Shirley Strum Kenny who notes that while universities '*…have done a lot of interesting things…*' to aid undergraduate education, Boyer's original ten point agenda for change had not become '*…part of the real value system of research universities and it's really time to do something about it…*' (Wilson, 1998, p13).

Ten years after the publication of the Boyer report Higher Education Institutions in the UK are also faced with concern at the quality of undergraduate education and with responding to changes in students and student experience. Many undergraduate students embrace information technology to such an extent that they have evolved into what have been described as 'digital natives' (compared to their lecturers who are termed 'digital immigrants'; Prensky, 2001). Unfortunately ten years after Boyers initial report the digital native/immigrant divide still exists. At a recent keynote lecture at the Technologies in Learning and Teaching conference (TILT2008) held at UCL last April, Sir David Watson (Director, Institute of Education) stressed that the need for the digital natives to develop a broad collection of skills that had employment value was probably the single biggest factor affecting the higher education sector. Given that the modern day undergraduate student is acutely aware of the employment value of a degree and the overall experience of obtaining the degree, it is incumbent on educators to recognise the needs of the digital native. The 'digital native' student enters the HE sector with an 'information age mindset', (Frand, 2000, p15) and as such will have the characteristics below.

1. **Zero tolerance for delays.** Undergraduates have been brought up in a world of SMS, MMS, mobile telephony and the internet. Information is instantly available and it is expected to be at hand 24/7. This is not to say the information age students are lazy – far from it, in fact testament to the durable work ethic of the undergraduates is the fact that even with the need to engage in significant part-time employment and their studies, student volunteering has also increased significantly (Watson, 2008). Students cannot understand departmental infrastructure where decisions sometimes can take several committees worth of time before they are acted on. At the same time student interaction needs to be transparent – getting assignment feedback to the students within a week is fine as long as they are aware of the return date and also the reason for this period of time.
2. **The internet is better than TV.** The internet is now the primary source of entertainment and learning for digital age students. The vertical transfer of information via the TV set is simply not sufficient. The internet is a bottomless pit of information and students embrace this repository at every stage of their undergraduate careers. Unfortunately, there is usually no peer review or quality assurance of the work that is to be used. Students thus need to be guided appropriately to ensure that they '*detect what is sophistical, and discard what is irrelevant'* (Newman, 1873 p. 160)
3. **Doing rather than knowing.** Frand (2000) argues that the very nature of the industrial world that undergraduate students will be entering defines the nature of the experience that they will have at

university. As graduates they will have to contend with a work place that is global and rapid. The skills that they seek will have to be in preparation for this kind of work place. In a world where the one of the richest individuals dropped out of university (Bill Gates), what you can do, (find out, solve problems, access information and solutions) may be more important than what you know.

4. **Computers aren't technology.** A new technology is defined as being something that wasn't around when you were born. The technological evolution, however, is occurring at such a fast pace that what was recently the processing power of high-end computer workstations is now available in most mobile telephones. Having the ability to access the Internet from any place on earth via your mobile phone is the standard that is expected by today's undergraduates.
5. **Staying connected**. Students now need to feel, and be, connected to each other on a 24/7 basis. This means on the bus, at work even in lectures. Mobile telephony is the premier vector of choice to ensure that communication is maintained. In light of the recent debate in the THES regarding lecture time texting it would seem that that this phenomena is becoming more and more prevalent (See eg., Furedi, 2008). The expansion of social networking sites such as Facebook, MySpace *etc* has seen their use rise within an academic setting. The very thought of not being in touch at any place or time is alien to the digital native student. As connectivity grows, however this in turn shapes the flow of information and the old synchronous constraints disappear towards a more asynchronous dialogue which can take place at any time and place.
6. **Nintendo over logic.** The Nintendo games console brought with it a unique skill set that clearly differentiates people from the information age. When a digital native picks up a Nintendo game and starts to play it they lose and start again, and again and again. In fact, the only way to learn how to play the game is to lose but with constant trial and error the user starts to gain expertise over the game. This approach is anathema to the digital immigrant who is used to poring over books and instructions manuals before letting themselves lose on a task or piece of equipment. Every time the digital natives lose on Nintendo they gain, as each loss is a learning experience. It remains to been seen, however, how far trial and error learning can sustain student attention in academic work – games have carefully constructed levels that scaffold learning and reward progress.
7. **Multitasking is a way of life**. We have access to information in a steadily growing number and diversity of means – 1,000s of TV channels and potentially infinite number of internet sites is at our finger tips. Within each of these channels the capacity for information transfer is increasing, e.g., during a five minute viewing session on MTV an observer is exposed to hundreds of different images. Given that the human sensory system is not designed for such a heavy information transfer we regularly experience the phenomena of information overload – it is a similar effect to the semantic saturation effect that you experience if you say a single word over and over again (try saying 'apple' in quick succession and you will temporarily lose the concept of the word). With regards to our everyday lives we simply do not take in the information that is presented to us. The digital native student counters for this limitation by multitasking. This multitasking may occur at every level of the students' day - they will text questions regarding a lecture or coursework to their peers while at work and they use social networking sites to create study groups for example. For many the singular mode of information transfer is simply inefficient.
8. **Typing rather than handwriting.** This does not imply that the digital native generation has lost penmanship altogether, rather they have evolved a new form of penmanship that is unique to the word processor. On a word processor, it is possible to generate a document in a lateral fashion jumping back and forth from a plan to the body of the text. This process results in the generation of a document that has been generated in a more meaningful way '*it's not the typing but the power behind the typing that is so important'* (Frand, 2000, p 18).

The Frand criteria for digital natives are diagnostic of a mindset for the modern day undergraduates. This style of thinking and (more importantly) doing things differs markedly from the generation of students that came before them. Given the fact that with this mindset comes the expectation that this is what they will experience during their university life it is important that educators meet the expectations as best we can. More importantly given the fact that undergraduate admissions applications tend to reflect the HEFCE fee allocation it is very important to meet the expectations of the incoming undergraduate cohort as best as possible.

The problem: In light of Boyer's earlier recommendations lectures should be sufficiently engaging so that they inspire and engage the students within a learning community. Given that integration into an undergraduate social community is correlated with student retention and overall course satisfaction, it is essential that a community be maintained for the continued development of an academic course (Tinto, 1997).

The solution: The Virtual Pedagogy Initiative (VPI) is a five strand teaching project that helps undergraduate students to learn in a more flexible manner. No longer will lectures just consist of a room of students intently listening to their tutor at the front of the class! The initiative may be able to accelerate the process of change in terms of the way students learn. Here, we provide an overview of each of the five strands of the VPI, in additional to data that we have collected from the students and their experiences of using each of these techniques. Some data is still being collected from some of the strands. Finally we also provide a technical section and SWOT analysis to assist colleagues who want to adopt these techniques in their own teaching.

The initiative has attracted media interest (see evidence below) and has already been used to allow students in South Africa to take part in lectures at Aston and also to show a real time brain scan as part of a first year undergraduate lecture. Individual components of the VPI are in place at other institutions but the entire development, and application, of the VPI here at Aston is a grass roots initiative. That is the students have told us what they need and we have developed the technology around these needs. Such an approach is unique and the initiative was recognized recently by being shortlisted for the 2007 *Outstanding ICT Initiative of the Year* award by the Times Higher Education Supplement at the Park Lane Hotel, London.

The overall aim of this article is to provide a progress report of where the VPI currently stands at Aston and also to provide technical details so that colleagues can readily adopt any if the techniques noted here should they wish to do so.

Podcasting

What is it ?

Podcasting is the creation of a professional quality audio stream that students can either stream onto an iPod or listen to online anywhere in the world. It must be stressed that podcasting refers to a process as well as the object. For a broadcast to be considered a podcast users must be able to subscribe from it via the internet. If the material can only be obtained via a VLE (which requires a password) or other closed networks the broadcasts are called 'narrowcasts'.

Podcasting Technical Requirements and Process Walkthrough

Lecture-based podcasts were recorded on a *Sony MZ-R700 Recording Minidisc Walkman*. An omnidirectional, back electret condensing *Yoga EM116* microphone was used via the MIC input of the Minidisc recorder. This specific microphone has a sensitivity of -65dB and an impedance of 1kΩ. Hardware based audio compression was set to record at a long playing setting (LP2), effectively giving approximately 160 minutes of stereo recording on a single standard 80 minute minidisc. The recording level was manually set to approximately 75%, so that the integrated level meter measured peaks around the -12dB indicator when the lecturer spoke as if to the room.

Once secured to the lecturer, the recording was started and the HOLD switch used to lock the controls from accidental use during recording. The resulting audio file was transferred to PC via a *Creative Soundblaster Audigy 2* soundcard. The software used for editing was environment was Windows XP SP2 running on a 2.80GHz Pentium 4 processor and 1 GB of RAM. *Audacity* version 1.2.6 (available at http://audacity.sourceforge.net/ and covered by a GNU General Public License) was used to record and edit the soundfile.

Once completed, an export was made of the entire audio so that it could be dubbed to the video for later use. Then, edits were made of periods not relevant to the podcast, such as group activity within the theatre. The edited audio was opened and closed with a selected piece of royalty free music. The whole lecture was then exported at 128Kbps in mp3 format.

What do students think of it ?

To examine student attitudes towards the use of pod and vodcasting a series of eight lectures on the Psychology first year practical module were made available as audio and video files (see vodcast section below) and broadcast on the internet. For comparison purposes the students were randomly divided into three groups where they were asked to subscribe to either a) podcasts, b) vodcasts or c) powerpoints slides only. Ninety three students then returned open ended WebCT surveys on their attitudes and experiences of these media. The full results of this study are reported in Parsons *et al*, (2008) and only the thematic data is summarised here.

Results

Given that the students were merely asked to subscribe to one broadcast group the purpose of the survey was to examine usage patterns of the other media to examine, which one they preferred to use. The usage patterns shows that the students used all three of the learning aids equally. Following a thematic analysis the items from the open ended questionnaires were separated into three thematic clusters and summary data for each of these themes are shown here.

Theme 1 : Facilitation of Community Involvement

The internet broadcasts were considered to be a resource that others could tap into, giving other people the chance to learn something from anywhere in the world. The students felt that this was a very positive and altruistic advantage, and something that the University should take pride in. In line with Boyer's earlier recommendations the broadcasts did facilitate community involvement.

> *"We should all share and share alike ;-) If someone in another country can broaden their knowledge by watching our lectures and we can broaden our knowledge by watching theirs than we can all share our knowledge and experiences. This benefits all."*

> *"It's good that everyone can access them to help widen peoples' knowledge about psychological practices"*

Perhaps quite unsurprisingly the students also felt that having lecture material online was good for the University as a whole on an international platform and prospective students how innovative and technologically advanced the course was an important aspect for future students in an increasingly technological world.

> *"What's wrong with letting others see how cool our lectures are?"*

> *"It is beneficial to Aston because it would give prospective students a real insight into how the course is run. In general terms it may inspire more people to choose to study psychology."*

> *"Why not, they are entertaining and help to illustrate how technically innovative university is becoming"*

Theme 2: Improving learning and Theme 3 Facilitating Flexible Learning

The educational benefit of the broadcast media was acknowledged by the students.

> *"If you have missed something in the lecture or you need visual revision for certain procedures then having this facility would really help."*

> *"It's brilliant. It is great to recall the lectures this way; it is more visual and easier to remember. It is actually exciting to see it and one looks forward to it."*

Perhaps unsurprisingly students also felt that online material was a convenient way to learn in a flexible manner.

> "*If we do end up missing a lecture, this is a VERY helpful way to catch up. Also, it is a much better way to revise. If we don't remember a certain part, or if we did go to the lecture but didn't feel too well, therefore couldn't concentrate, we can go back to it later. This term I couldn't concentrate too much or work too well because I was quite occupied with adjusting and trying not to be too homesick. So going over the broadcasts over the holiday will be very helpful. I wish I could watch all my lectures again."*

SWOT analysis (Podcasts)

Strengths:

1. The user has complete control and flexibility with its usage therefore facilitating multitasking. It is also an excellent way to review lecture information at a future point.
2. Relatively light bandwidth requirements ensure that there is little, if any, delay in network transfer thereby ensuring availability on a range of different computers.
3. To date only one provider has charged for subscription to a podcast (Ricky Gervais show) all other subscriptions are free which ensures that a podcast will have excellent market penetration.

Weaknesses:

1. Dependant on a broadcast player such as an IPOD, or computer with head phones/speakers to listen to the podcast.
2. The user has to connect to the internet on a regular basis in order subscribe to the broadcast this also requires a small element of technical knowledge which would exclude older generations.
3. Relies on a single sensory stream (audition) therefore may exclude the hearing impaired.

Opportunities:

1. When used with embedded powerpoint slides to create enhanced podcasts both the lecture slides and auditory stream can be access by the student simultaneously.
2. As podcasts are dependant on the internet for broadcast it is possible to host distance learning courses for a potential global audience.
3. Listening to material demands less attention that the watching a video excerpt and as such they can be readily adopted when embedded within existing material.

Threats:

1. At this time podcasts cannot be broadcast to mobile phones – given the market saturation of mobile telephony the development of any audio broadcast subscription service to a mobile phone provider would replace podcasts.
2. The advent of push technology in certain websites would allow consumers to access material without connecting to the internet at regular intervals.

3. By its nature the student must subscribe to a podcast service before receiving regular broadcasts some individuals may not feel comfortable with having to subscribe to service or may not own their own computers which would allow for a personal subscription.

Vodcasting

What is it ?

The second strand of the initiative is Vodcasting (as for podcasting but with video material), and this really takes lectures out of the classroom and to the students. The beauty of vodcasts is that they can potentially capture both the lecture, the audience participation and the lecturers' own personal style, and this does have an impact.

Vodcasting Technical Requirements and Process Walkthrough

Lecture based vodcasts were recorded on a *Sony DCR-HC94E Digital Video* (DV) camera. All audio used in the vodcast was taken from that recorded for the podcast. Hardware recording parameters were set as follows, with any unmentioned set at factory default. Recording mode was set at a standard play (SP) speed, providing 60 minutes capacity from a *TDK DVM60 MiniDV* cassette. Aspect ration was set to 4:3 rather than 16:9 widescreen in order to fully optimise the viewable area when synced to video capable 5th generation iPods. Recording was undertaken by a member of staff in two different roles. During static shots, an audience point-of-view (POV) was used to capture presentation slides and also panned to include the speaker. When finer details were to be recorded during the teaching sessions, the camera was manipulated upon a counterbalanced weight, which enabled smooth and flexible motion. An example of this technology can be found at: http://www.cs.cmu.edu/~johnny/steadycam/. The resulting video was captured onto PC via USB connection using Microsoft's *Windows Movie Maker*. PC hardware specification was as described in the podcast technical walkthrough.

The audio from this video was muted and the mp3 file of the unedited audio, recorded for the purpose of podcasting, was dubbed onto the video. A suitable visual cue was used to synchronise this audio with the video. This was achieved by sliding the audio and video along a common timeline. Once synchronised, an export was made at the *High Quality Video (large)* setting, of the entire unedited movie so that audio and video could be locked together. Details for this export are set by Windows to be: 640 x 480 pixel resolution, with a variable bit rate and at 25 frames per second, Windows Media Video (.wmv) file format.

This new movie was then imported into Movie Maker so that edits could be made of periods not relevant to the vodcast. The edited movie was opened and closed with a selected piece of royalty free music, together with title and credit slides, as appropriate. This edited movie was then exported to the same specification as before.

The final movie was then optimised for iPod screen resolution (320 x 240 pixels) using Mac software, *iSquint* v1.5, (produced by Techspansion and available from http://www.isquint.org) and exported as an MPEG-4 file (.mp4) at standard quality output and with all user-definable settings at default. Resulting files were approximately 1.5Mb per minute of video.

What do students think of it ?

As vodcasts and podcasts were piloted together the thematic summary described in the podcast section applies to this broadcast as well.

SWOT analysis (Vodcasts)

Strengths:

1. As both video and audio streams are played vodcasting allows the playback of the full lecture experience including the capture of the idiosyncratic lecturers style.
2. Students may start to feel more affiliation to a lecturer that they can physically see as opposed to just hear via the podcast.
3. Feedback and class discussion can also be captured (as well as the lecturers response to it).

Weaknesses:

1. Relatively high bandwidth required for optimal play back therefore not accessible for all types of computers.
2. Any editing (or cutting of fluffs etc) is likely to impact significantly on the overall quality of the broadcasts and therefore the lecturer has to be careful of mistakes
3. Do to the global nature of the vodcasts and podcasts some lecturers may be reticent about talking about their latest work as it has the potential to be broadcast around the globe and they may lose out to competitors etc

Opportunities:

1. The rise in access of internet based mobile telephony could see a near 100% saturation of vodcast usage with the videos being downloaded to students mobile phones.
2. As described above, vodcasts, like podcasts are hosted via the internet and as such have a potential global market reach.
3. There is also ample and easy opportunity to ensure that brand platforms can be placed in prominent positions throughout the vodcasts thus allowing the opportunity for certain forms of sponsorship.

Threats:

1. The relatively slow down load time means that lecturers will start to broadcast smaller and smaller vodcasts which will see an eventual reduction in content.
2. The quality of the video feed is dependant on the quality of the students monitors. Students with low quality monitors will be slow adopters for this technology.
3. Watching a video demands more attention that listening to a podcast and as such vodcasts are relatively obtrusive.

Mobile telephony

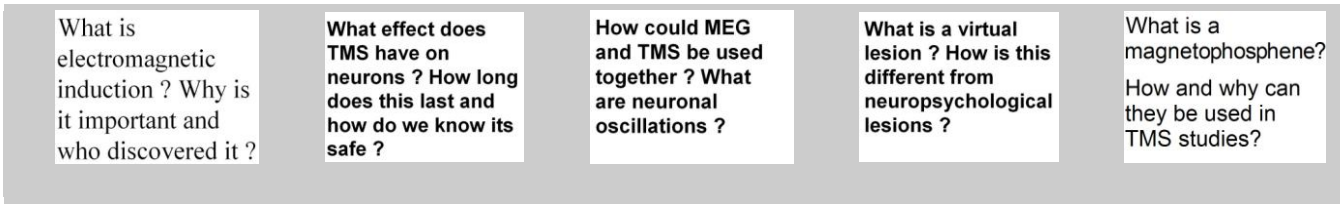
What is it ?

Originally it was planned to develop ‘Minipods’, high-quality, short video files that would be sent to individual student mobile phones using MMS or Bluetooth technology. These Mini-pods would provide students with a 30-second snapshot of the most salient points of a lecture, which they can then refer to at a later date. Students can subscribe to this service via their mobile phones. Student feedback, however, has been mixed – while undergraduates do like to communicate via mobile phones, some feel uncomfortable watching a video clip of their lecturer talking to them. So the strategy has been defined and redeveloped slightly to take this into account and now involves peer-to-peer data transfer via the free bluetooth protocol.

Mobile Telephony Requirements and Process Walkthrough

A series of lecture 'slides' were prepared as images in jpeg format at a resolution of 640 x 480 pixels. This resolution was deemed most appropriate so that it could be viewed on even the lowest of specification mobile phone screens capable of showing images. The slides were visually optimised so that they encapsulated the salient points of the topic under examination and were clear to read at any resolution without the need to upload to a computer to view. All this was undertaken in *Paint* software, bundled with all Microsoft Windows environments. Examples of slides prepared are provided in Fig. 1.

Fig. 1. Lecture 'slides' prepared for Bluetooth transfer to mobile phones.



Once prepared, all these images were transferred via Bluetooth to the lecturer's mobile phone from an iMac with suitable connectivity built in. At a suitable point in the lecture session, students were asked to switch on any Bluetooth enabled devices and make such devices discoverable for a short period. Many devices have a 'discoverable for 60 seconds' setting to enable privacy. Once a list of 20 devices had been populated on the lecturer's mobile phone (a Motorola L6), the image file was copied via bluetooth to a recipient chosen at random from the list of available devices. If connection could not be established within a few seconds, the transfer was cancelled and another device chosen at random.

Once transfer was completed, the lecturer checked that someone within the room had received the transfer. The class were then instructed to disseminate the image to their peers if they received it. This would encourage viral delivery of the material.

What do students think of it ?

In the 2006/07 session, we carried out a pilot study on the efficacy and delivery of video clips via mobile phones. Quite emphatically the student body did not take to this technology, in fact some were aggressively anti-minipods. Further investigation of this attitude revealed that the students felt that a video delivered to their mobile phone was in some ways a violation of their privacy. Comments such as '*when I go home I don't want Dr ….. telling me what to read on my phone*' (S3) reinforced the notion that the mobile telephones were considered personal and private. The students, however, also suggested that they did want the bulletins that contained short take home msgs or directions to further readings. The cost implication was also mentioned in some of the interviews/questionnaires. Later in 2007 we decided to build on our earlier exercise and deliver a complete lecture via free peer-to-peer bluetooth technology. This was a development of the earlier strategy and involved the delivery of a single lecture over the course of five weeks via a single JPG snapshot to one member of the class. (We stressed that it was the responsibility of the student members to forward it to each other as we also wanted to examine the efficacy of 'viral delivery' of lectures). The topic of the lecture was the neuropsychological technique of Transcranial magnetic stimulation (TMS; see Senior, 2002), which is a technique that, due to the various health and safety restrictions we can no longer deliver to the students in the standard lecture format. Each of the JPG bulletins contained a max of four lines of a statement about the principles of TMS and some directions to further reading. The students were told that they were going to have a WebCT quiz on TMS after the course (which is the standard assessment on this module) alongside a WebCT based questionnaire on their experiences and attitudes towards mobile telephone in an academic setting. These data are still being analysed but an initial thematic analysis of the data revealed positive attitude towards this approach. When asked *why* the students felt that the delivery of lectures via bluetooth was a good thing comments revealed a largely positive attitudes towards this approach:

'because all students have a mobile phone so its good to make educational uses of it'

'it's the next logical step, but still weird'.

'accessibility, convinience [sic], gives more opportunity for discussion between students'

As described above the data are still being analysed but will be submitted to peer reviewed publication in due course.

SWOT analysis (Mobile telephony).

Strengths:

1. Mobile telephony is ubiquitous with a near 100% market penetration along and with this level of usage comes a level of competence so little time will be spent learning how to use this technology.
2. Fixed price 'all-you-can-eat' deals for mobile content are helping to drive content consumption.
3. The technology is evolving rapidly with the advent if video and WIFI capable mobile telephones thus ensuring that users are familiar with these technologies.

Weaknesses:

1. In terms of handsets, the market is actually getting more fragmented which means that it is getting harder rather than easier to work towards a user experience which is satisfactory across the board.
2. There is a still a cost implication for MMS messaging (although SMS messaging is largely covered by most contracts).
3. Students consider mobiles phones to be a personal thing and thus feel uncomfortable with videos of their lecturers reminding them about lecture highlights etc.

Opportunities:

1. The mobile phone is a very personal device and thus has great utility for the retention and acquisition of novel bulletins.
2. The novelty aspect of a lecture bulletin delivered via mobile telephony ensures that it can be spread to peers in a rapid fashion thus facilitating a viral delivery of lecture points.
3. Near field communication strategies such as 'bluecasting' allows a free msg to be sent to a large group of people as they walk past a transmission point thus allowing passive and free delivery of lecture bulletins

Threats:

1. It continues to get more difficult for companies to provide a consistent experience across different browsers and the ever expanding variety of handsets and personal devices on the market.
2. From the point of view of the mobile operators, there are numerous threats which boil down to any disintermediation from the value chain.
3. The advent of personal digital assistants and also email compatible mobile phone handsets will ensure that student access delivered information via their free email accounts.

Campuscam

What is it ?

The initial rationale for the development of this strand of the VPI was to engage to the students with the range of technologies that we have access to here at Aston, including the brain imaging facilities. Clearly, it is not possible to take 100+ students into the MRI lab for a hands on lecture. Hence, we had to take the MRI to the students. Such an approach serves to engage the student with the wider Aston community by exposing them to the state of the art facilities that are on campus (which otherwise they will not have access to until they reach the postgraduate level). After initial problems with the technology we have developed an MSN live messenger protocol that allows a near seamless transmission of an actual MRI experiment to any of the lecture rooms on site (or via the internet to any other site on the planet). The initial broadcast of the first live MRI lecture attracted the attention of the BBC who came in to the film the entire event.

CampusCam Technical Requirements and Process Walkthrough

Two practical sessions were broadcast from either controlled areas or remote laboratories with suitable access challenges. Both environments required the same technical requirements and process. Video was transmitted from the laboratory areas via an *Axis 212 PTZ* network camera. This method allows a preconfigured camera to be connected directly to a live network point on the campus and viewed from an internet browser, anywhere on campus via client software.

Hardware configuration was largely set to camera defaults. These being a maximum resolution of 640x480 pixels and broadcasting in motion JPEG. While the software features remote control (pan, tilt and zoom) of the camera, these features are best not used for the purpose of *campuscam*. Although the over sampling technology within the camera maintains a high quality image despite digital zoom, there are issues over remote control making physical manipulation of the camera difficult. For instance, if the camera is remote zoomed to a corner of the viewable area, then local movement of the camera becomes difficult for the operator. With the view set to a wide angle, this allows handheld manipulation of the camera and monitoring of the signal output, viewed on a computer across the room. This local monitoring ensures suitable direction of 'broadcast' images.

While these cameras have potential for simultaneous audio streams to be carried with the video, we chose to use to carry audio over the university telephone network. The *Cisco 7940 IP series* of telephone has a loudspeaker, so that a two-way communication can occur without the use of the handset. A secondary microphone was linked to the lecture theatre audio input so that the sound from the telephone speaker would be amplified to an appropriate level for a large group.

The laboratory phone was used to initiate the call with the lecture theatre. This is because the audio from the initiating call will always take precedence over the audio from the receiving telephone. This order prevents audio being broadcast from being silenced by audio feedback and comments being made in the lecture auditorium.

Prior to the teaching session the audio link was made via telephone as directed above and volume levels set appropriately in order to prevent feedback. This link was maintained throughout the session even when not required. This enabled monitoring from the remote location of the status of the lecture. To prevent unintended audio noise from being heard during the lecture the mute button was used in the remote location. When the lecturer announced a link, the phone was unmuted and conversation ensued.

At this stage, the lecturer will switch to their internet browser to the appropriate address for the webcam. At Aston, there are two remote cameras, one placed in the MRI suite, located in the *Aston Academy of Life Sciences* (AALS) and the other in the MEG suite on the Neuroscience Research corridor in the Vision Science building. The IP addresses for these cameras are:

MEG laboratory: http://134.151.102.160
MRI suite: http://134.151.102.161

Login details for these cameras are required. The username is *demo* and the password is *aston*. As this technique forms a live broadcast, no post-production is required.

What do students think of it ?

Initial feedback is good - the data is currently being collected

SWOT analysis (Campus Cam).

Strengths:

1. Allows a large group of students to observe and participate in various activities that they would not have previously been able to to do so e.g., functional brain imaging experiments etc.
2. By its nature it is immersive thereby and thus directly facilitates involvement in a learning community.
3. The technology is very low level and as such accessible to many institutes.

Weaknesses:

1. It is reliant on the University phone lines for the transfer for the information for internal broadcasts within the campus network and therefore sensitive to the normal problems that that may occur with such a network.
2. Any involvement with the facility being connected with would have to be at a group level therefore denying individual students the change to engage with the technique being demonstrated. This would mean that the standard class dynamics would still be in place (shy students don't say any thing etc..).
3. The technology only allows you to communicate a topic to another site – there is no control over the nature of that topic or the lecturing style (it could still be boring!).

Opportunities:

1. It is possible to use this to have national, European and international real-time lectures or debates across various sites.
2. The use of the campus cam technique also makes it possible for Aston students to have interactive sessions with facilities that aren't at Aston such as high field MRI (7 Tesla).
3. Most students have access to a webcam and can therefore contribute towards a class from any place on the planet – it is not just being in a class when the campus link is projected in.

Threats:

1. Places like the MRI labs have to be free for the class to take place and therefore requires bookings around other usage of the facilities such as clinical time etc
2. To experience the campus cam lecture the students have to be in place in the lecture room at the timetabled time and there is no way to replay the lecture if they arrive late or want to revise it at a later date
3. The ability to feed video directly onto places like 'youtube' etc from your mobile phone is likely to impact on the use of the campus cam.

REFERENCES

Boyatzis, R. E. (1998). Transforming Qualitative Information: Thematic Analysis and Code Development. Thousand Oaks, CA: Sage.

Boyer, E.L.(1997) *Scholarship Reconsidered: Priorities of the Professoriate*. Carnegie Foundation for the Advancement of Teaching. Jossey-Bass, USA.

Frand JL (2000). The Information age mindset : Changes in students and implications for Higher Education. Educause Review 35(5).14-24

Furedi F (2008). It's a vxd question: why your lecture isn't as important as an SMS. *Times Higher Education*. 17 April 2008

Graham G (2005). The Institution of Intellectual Values: Realism and Idealism in Higher Education. Imprint Academic, UK

Newman JH (1873). The idea of a university. Regenary Gateway Press, USA.

Parson V, Reddy PA, Wood JB, & Senior C (2008, under review), Educating the IPOD generation: Examination of undergraduate attitudes, experiences and knowledge of internet broadcast media. *Learning, Media & Technology*

Prensky, M. (2001), Digital Natives, Digital Immigrants, *NCB University Press*, 9 (5), 1-6

Watson D (2008). The inner game of higher education. Keynote lecture presented at the TILT 2008 Conference, University College London, (15th April 2008).

Wilson R (1998). Research-University Presidents Dispute Carnegie Report on Undergraduate Education. The Chronicle of Higher Education. 44(36).10-13

Tinto, V. (1997). Classrooms as communities. *Journal of Higher Education*, 68, 599-623.

Senior C. (2002). Principles, safety and utility of transcranial magnetic stimulation in cognitive neuropsychology. *Australian Journal of Psychology.* 54(1). 40-45.

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