A CALL TO ARMS FOR HANDHELD DEVICES

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Introduction

What are the obstacles preventing the widespread use of mobile devices for CAA? This paper is intended to stimulate discussion on how to best introduce mobile devices to learners, and how to provide optimal support for mobile CAA. The discussion is an opportunity to more clearly delineate obstacles and therefore arrive at better solutions to the challenges of mobile CAA in FE and HE. Some of these are common to the introduction of CAA in general, others subtly different because of the nature of the delivery platform.

Background

Mobile learning utilises devices such as Personal Digital Assistants (PDAs), Smartphones, and Media players to deliver educational material and facilitate learning. Delivery of CAA on these platforms is unique due to device characteristics: the small screen size; varying device form-factors; input mechanisms, with some having touch screens and others miniature keyboards – and the non-traditional learning environments where devices are used. The potential of mobile devices in education is widely recognised: *"…mobile devices can become efficient and effective teaching and learning tools" (Roibas and Sanchez, 2002). It has been predicted that "In future, learners need not be tied to particular locations. They will be able to study at home, at work or in a local library or shopping center, as well as in colleges and universities"* (Sharples, 2000a).

In the primary and secondary education sector a 2003 report from BECTA and DfES into the use of handheld computers in schools noted *"Handheld Computers (PDAs) could bring important benefits to schools by assisting administration, supporting classroom management and enabling personal and group learning"* (Perry, 2003). In schools, the provision of computers is not as good as in HE and pupils often have to access a computer at scheduled times. The BECTA report notes *"A Further benefit of the small size of PDAs is that they can be accommodated in any classroom on a one-each basis"*.
This lack of availability of personal desktop machines may therefore make PDAs attractive to pupils, with the resultant familiarity engendering other uses

of the devices, and an exploration of their full potential. It is therefore unsurprising that the most publicly visible large scale projects have, so far, been in schools such as those in Wolverhampton, where up to 1000 pupils will be given PDAs (www.expresso.co.uk, 2005).
The 2005 JISC Landscape Report into the Use of Wireless and Mobile Technologies in Post-16 Education notes *"Student experience with mobile devices in schools is likely to have an impact on their expectations for similar use in post-16 education"* (Evans, 2005). FE and HE need to be as innovative as the schools in utilising new learning technologies.

Indeed there are many potential benefits for students in higher education if mobile learning can be successfully deployed. With many students working part time the use of mobile devices – with their obvious portability and 'instantly on' functionality – gives opportunities for learning at non-traditional times. This has been confirmed for specific learning situations. *"Our team carried out a detailed study of how radiology is taught and practised. …computer-based learning must fit into the gaps in their busy schedule - in the hospital, at home, when travelling - which means a personal and portable system."* (Sharples, 2000b). The proliferation of WiFi capabilities in PDAs, and increasing ubiquity of WiFi provision in coffee shops, service stations, pubs, etc. opens the way for network based CAA resources to be utilised. Our research has also shown that PDA use actually enhances small group activity amongst learners, as participants work face-to-face rather than facing a computer screen. We also recognise that an additional advantage of PDAs is their relative affordability, allowing devices to be loaned to students in class or lab situations.
The future for mobile CAA seems promising, with some favourable outcomes (Attewell, 2005), and an active mobile learning community in the UK, mainly focussed on F.E and H.E., with forums and where ideas and research are discussed by a number of small research teams, (www.jiscmail.ac.uk/pda-edu www.handheldlearning.co.uk). However, after a number of years trialling PDA use in undergraduate settings, we have met with mixed success, and it appears that this is not unusual. One of the problems is that to prove that mobile devices can work in FE and HE requires they are used enough, and for long enough to realise their potential, but this means convincing both users and stakeholders that mobile learning *can* work. *"Undoubtedly there is a threshold to cross which requires sufficient immersion in any new technology to reach a point where it is of unquestionable value"* (Perry, 2003).

Barriers to Adoption

It would appear that mobile learning is an ideal tool for use by FE and HE students, and initial barriers to adoption would initially appear to be predominantly technical – how to translate pre-existing content for mobile CAA use, and how to transfer content to learners.

There are already a number question banks making use of the IMS/QTI format, but discussions with mobile application developers indicate that many find the format too complex and so only support considerably simpler formats in their software. General, automated, question re-authoring from such complex formats is non-trivial, and so re-authoring may either need to be done manually at considerable expense, or questions from other, simpler sources (eg a local VLE) used.

Furthermore, if students are not to be granted or loaned a pre-setup PDA, the diversity of the mobile devices they may already own makes it difficult to provide material that can be used on all of them. This problem might be addressed by limiting device support to the more functional devices (PDAs under PalmOS and Windows Mobile) and developing simple meta-formats easily translated for specific software on each device. The properties of such meta-formats, and the means of keeping a consistent GUI over the device range are still points of argument. An even simpler method might be to present material in the simplest common denominator format of simple text files – or other proprietary formats which already have cross platform compatibility – and accept less rich content and a far degraded ease of use for the learner.

In addition, as the mobile device market is continually reinventing itself (with considerable advertising push), the range of devices that may be supported increases. For example, should the rise of the ubiquitous music playback on PDAs and mobile ‘phones indicate that questions and answers may be better provided to students as podcasts? Does CAA have to be provided in the latest technologies and formats in order to be embraced by learners?

To transfer data to mobile devices there are various methods depending on the type of device: ‘beaming by infrared or Bluetooth, ‘syncing’ via a cable to a desktop machine, supplied on removable media (e.g. SDCard), transferred by WiFi if enabled, or sent as an SMS message.

Many of these will require either extra hardware and/or software to be installed in labs. Altering of computing labs is something which normally requires co-operation and approval from the departmental/institutional computing support officers and often takes a long time to be agreed to and implemented. In the future Wifi would seem a good choice, but many institutions are still reluctant to allow ad-hoc connection to their networks and many have not got used to connecting fairly standard student laptops so a diversity of mobile devices may not be welcomed or supported for some time.

In our pilot studies at Glasgow we have found that even when many of the technical barriers have been overcome inter-personal, personal and social factors can have a major impact. For instance, we have found that a factor in the slow acceptance of mobile devices is how well provided students are with open access labs. For campus based students all the information they need is readily available without the need for the reward/effort tradeoffs of working with a small screen device. In a recent study we conducted some students chose not to use the mobile device as it was easier to wait until they got home to use a normal PC. This may not be the case for students based away from campus or part time students integrating their study with full time employment.
Other social and personal factors we have noted include: the disruption of pre-existing group hierarchies on introducing PDAs, with existing group leaders experiencing a 'loss of face' due to a lack of proficiency with the new technology, and more junior students hiding their proficiency; students unwilling to accept technology perceived to be out of date compared with the technology they already owned (grey scale PDAs, compared with colour screen mobile phones with objectively lower computing power). The principles are summarised in the JISC Landscape document, *"lack of success may be due to inappropriate use for a given context, loaned devices may lose the benefits of personalisation, and students may abandon their use of mobile technologies if they believe their social networks are under attack"* (Kukulska-Hulme *et al.*, 2005).

A Killer Solution?

In the electronics industry the concept of the 'killer application' is prevalent: the piece of software so obviously or addictively useful that it of itself persuades users to purchase and use a new piece of technology. The relatively short history of mobile CAA, has seen a number of technologies posited as the 'killer solutions' which will enthuse learners. Presently the iPod is a 'must have' device for many students and as its functionality is extended it may become a useful mobile learning device (in addition to the present limited use in downloading podcasts). Devices such as the Sony PSP have potential for use as a mobile learning tool, having a built in browser, WiFi, and imminently, a Macromedia Flash player.
Yet it may be that the very personal nature of devices, one of the strengths of the mobile electronics industry, may mean that there will not be one 'must have' application for everyone, but that multiple possibilities for mobile CAA may have to be provided to suit individual, and institutional circumstances.
It seems likely in future that institutions will have to cater for a wide variety of computing devices: laptops, tablet PCs, ultra-portable PCs, iPods and other devices. As wireless access points become more common, students will expect to be able to access learning resources from wherever they are. Many of the problems mentioned in this paper such as the production of suitable content for different platforms, enabling connection to their network of various devices, will have to be addressed in order for institutions to attract students and remain competitive.
We hope that this paper will form the basis of discussion, and whether that discussion leads to solutions that do form a 'killer app' for mobile CAA, or, as

is more likely, ideas on how best to adopt mobile CAA into one's own specific institution, it may have instrumental in moving the field forward.

Points for discussion

How best to translate existing content for mobile CAA?
(Content changes to aid translation and usability, supported device subset)

How best to transfer content to learners?
(wired/wireless, central/distributed dissemination, simple/multimedia, intermittently/continually online)

Social barriers.
(Which social barriers have we encountered, and which are critical)

Staff & Institutional perception of mobile CAA.
("those little screens are too small to do anything with", etc.)

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