Towards a mobile learning strategy to support Higher Education

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Abstract

Mobile devices, in particular the mobile phone, are ubiquitous amongst the western world population. Worldwide, Universities are experimenting with the potential mobile devices offer for broadening teaching and learning opportunities and reaching more diverse, and technology aware, learners. However, where does this leave the less technology rich and what can be done to develop an equitable strategy to promote and support the advantage mobile technology might provide? This report discusses a number of case studies from UK and overseas HE institutions and gauges staff and student attitudes, at a Midland university, and their willingness to engage with mobile technology and content in an educational sense. The report concludes with recommendations to move forward which may be applicable to inform institutional policy and practice at other universities.

Key Words: Mobile technology, mobile learning, m-learning, mobile devices (or gadgets), smartphone (or mobile phone) learning

Introduction

International interest in the use of mobile technologies for teaching and learning is flourishing as evidenced by the World Conference on Mobile Learning (mLearn, 2011).

National research, focussing on higher education, is supported and promoted by organisations such as JISC (JISC, 2010) and the Open University (OU, 2011, p.4).

The Higher Education Funding Council's current Business Plan 2011-2015 (HEFCE, 2011) stresses "We will also maintain our commitment to widening participation in higher education, and to encouraging a diverse and flexible range of provision." The use of mobile technologies, including those typically owned by students such as the mobile phone, has the potential to enhance and diversify learning by making learning more inclusive, not time and location bound. The freedom offered by mobile learning opens up opportunities for work-based learners, learners with other (employment and otherwise) commitments and possibly learners with mobility issues.

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Convenience, flexibility and freedom are characteristic of a mode of learning evolved for the busy and/or remote learner. However, defining m-learning in concise terms is not a simple task. "Formal definitions from European and Government agencies espouse its relationship to e-learning. Technologists place a high emphasis on novelty and the functionality of the devices (phones, PDAs, iPods, PSPs) themselves" (Winters, 2006, p.7). Traxler (2007, p.4) describes such definitions as "constraining" and "techno-centric" and observes, "For each learner, the nature of 'mobility' has a variety of connotations…it may be learning whilst traveling, driving, sitting or walking; it may be hands-free or eyes-free learning" and suggests, "How it is eventually conceptualised will determine perceptions and expectations, and will determine its evolution and future." Mobile learning may be described as:

"Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies." (O'Malley et al, 2003, p.6)

Mobile learning is not a new concept since any learning outside of the traditional classroom could be described as 'mobile', e.g. students on a field trip taking notes with pencil and paper. However, for this report's purposes, the culture being examined is that which takes advantage of 'modern' technology to support and enhance student learning both situated (e.g. in the workplace) and non-situated (e.g. travelling on public transport) outside of the traditional classroom setting. In this instance the technology cannot be entirely removed from the concept thus available mobile technologies are considered.

Technologies

Devices range from pocket-sized highly portable gadgets such as mobile phones and iPods to easily transportable appliances such as ultra-PCs and laptops. The range of capabilities varies both between devices and within device types. An iphone is like a mini-computer, able to support advanced applications such as iStudiez Pro for managing student life (Apple, 2010), whereas many other mobile phones have basic characteristic mobile phone features. However, with the proliferation of new 'smartphone' features, such as internet browsing, "this gap has blurred" and "nearly all new phones would fit in this 'smartphone' label" (JISC, 2010c). Due to their ubiquitous and multi-faceted nature, offering communication capabilities; data/and image capture; media playback and internet access, mobile phones hold great potential for deploying and creating teaching and learning content.

Other potential technologies include MP3 players, PDAs, e-book readers, games consoles. Whilst a PDA is a "relatively cheap" mini-computer offering "pocket versions of basic office software" (JISC, 2005, p.12), they have been somewhat surpassed by the advent of tablet computers. E-book readers and MP3 players are considered single purpose, i.e. respectively for reading and reviewing electronic books and playing music and audio files. However, some mp3 players have recording capabilities and can thus also support content creation and e-book readers can offer extra features including text-to-speech and web browsing. PDAs "can support dynamic group activities", without

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dependency on internet connectivity, "by the use of beaming" between devices, however, "conveying large quantities of information in text format" may prove "unsuitable" (JISC, 2005, p.30).

"Paralleling the development of PDAs, handheld games consoles are becoming far more capable computers….and are increasingly capable of delivering rich e-learning" (BECTA, 2008). The three main market competitors: Sony PSP (Play Station Portable), Nintendo DS and Nokia N-Gage, all are internet enabled albeit in the case of the DS with the application of an external ROM cartridge containing the Opera web browser. These handhelds offer educational potential with specific 'brain training' games, literacy, numeracy and language learning applications. The DS features a microphone for voice input and "wireless networking" allowing "DS consoles to communicate to other DS consoles in the local area" (BECTA, 2008). The successor to the DS, the DSi, enables handwriting directly onto its touch screen using a stylus "this function allows the user to write any script" thus potentially supporting non-European language learning i.e. Chinese/Japanese script (Narumi-Munro, 2010).

MP3 players, mobile phones and iPods can all host 'podcasted' lectures, interviews and other audio material useful for reviewing lecture material, listening to subject related reports, analysing and interpreting and revision.

Ultra-PCs and laptops generally have all the capabilities of a desktop PC, including connectivity enabling web access and communication where networking facilities exist – their disadvantage being their physical size in comparison to other mobile devices. Many of the above devices, with the exception of MP3 players, have web browsing and communication abilities although collaborative work may be hindered by network availability, individual device capability and connection costs.

Issues & Barriers

Frequently cited issues concerning use of mobile technologies include favouring technically-savvy learners and problems with small screens and keyboards. Corbeil & Corbeil (2007) suggest the introduction of mobile technologies into learning "can create a feeling of isolation or of being out-of-the-loop for non-techies". Some devices may have screens that can be read comfortably, i.e. Amazon Kindle with its "e-ink electronic paper screen" (Naravane, 2010), or reasonable sized keyboards, e.g. netbooks. However, handheld devices, such as mobile phones, albeit greater on portability, have small screens, low image resolution and tiny keypads (Wang & Higgins, 2006).

Barriers to the implementation of mobile learning include resistance to change, sometimes through fear of failure, "Instructors often hesitate to integrate new products or technology into their courses without evidence that it will benefit student learning" (Brittain et al, 2006, p.2), and lack of faculty or institution support on the grounds of cost, human resources, physical estates, institutional reputation, intellectual property, expertise and culture (Traxler, 2007, p.10). While apprehension may exist within academia, and support and cost issues may be real, institutions have their 'pioneers' as evidenced by projects at Wolverhampton (Brett, 2008, 2009; Dale & Povey, 2009) and

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University of Edinburgh (Narumi-Munro, 2010; Hemmi et al, 2010) and they have their success stories to share and inspire.

Benefits

Where pertinent, for example for production of tourist heritage podcasts (Dale & Povey, 2009), the m-learning experience can be significant in its true-life application in addition to proving motivating and developing generic skills of relevance to the industry thereby promoting employability.

"Mobile and wireless devices have supported presentational, interactive and creative forms of learning" (JISC, 2005, p.9) Visual and auditory learners can be assisted via support for video and audio multimedia and kinaesthetic learners may benefit from activities involving practical application of mobile technology e.g. podcast creation. Associative learners may be supported by the deployment of bite-sized learning resources, guided instruction and quizzes direct to a mobile device; constructivist and social constructivist learning can be facilitated through the ability to capture data in the field, practice simulations e.g. on gaming devices and amass evidence and data, supported by connectivity enabling conversation and collaboration, to build knowledge. (JISC, 2007) The ability to usefully employ mobile technology 'in the field' for example for work-based learning, e.g. student nurses building e-portfolios for reflection (Nicholson, 2008), or just-in-time learning, where the required information is delivered to the recipient at the point of need, aids situated learning.

Mobile devices enable tutors to provide spontaneous feedback, and personal learning activities, to whole cohorts, groups or individual students (Narumi-Munro, 2010), "learners and users regard handheld devices as far more 'personal' than the equivalent static or desktop devices" (Traxler & Kukulska-Hulme, 2005), communication is generally more immediate and, according to Horstmanshof (2004) "private and handy".

"A powerful benefit of mobile learning is that learners do not have to be separated from their day to day commitments. As learning becomes situated in a wider variety of locations, the potential for cross-fertilisation of ideas and values increases, as does the potential for learning to become an attractive pastime for a greater number of people" (JISC, 2005).

Case Studies

The following case studies illustrate how different Universities have incorporated mobile learning and highlight both the positive and negative aspects of the student experience.

Charles Sturt University, Australia, conducted a project "to examine how podcasting can be used to address the preconceptions and anxiety that students bring into the University classroom" on the premise that "Short preclass listening segments…are more effective than Web or print-based prereading". Podcast length was based on average travel time to campus and current and previous cohort students were involved in producing the "talkback radio-style episodes" with the lecturer or other "guest" being

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brought in to "offer insight into, or clarification of, the more complex or difficult topics and issues." Almost all (96%) responded positively to receiving the 3 to 10 minute pre-class listening podcasts, however, only 50% reported having access to a portable MP3 player, the others only having access on a PC (Lee & Chan, 2005).

Dale & Povey (2009) describe a project within a third-year undergraduate module at Wolverhampton University, Heritage Management, whereby student groups produced podcasts for various heritage attractions for use as visitor guides. A reflective element involved keeping a weekly blog of their learning experiences. They purport, "The students in the study acquired a skill that they can take to a prospective employer" and as students had to "understand the subject material before applying it to the heritage attraction" this enabled "a deeper theoretical understanding of the subject matter". The students "presented their podcasts as part of a formative assessment and were invited to comment on the podcast creations of their peers". Reactions were mixed:

"When writing an essay you look at it just from the theory and management perspective. With this you look from the consumer perspective and really start to understand what they want to know",

"the majority of the practical podcasting sessions were concerned with making the end product, rather than engaging deeper into the subject at that time."

Other concerns related to lack of familiarity with the technology and limited access to hardware. Students were also dismayed at not receiving summative grades for their work.

The University of Wolverhampton, in a pioneering University-wide JISC funded project, MeLAS (mobiles enhancing learning and support) investigated the "value of SMS for learning and teaching" by applying it for one way (staff to learner) communication, formative assessment with feedback and collaborative learning. Formative assessment questions comprised True/False, multiple choice and free text response with a voluntary maximum of three questions per set to avoid overload. The project team extended the SMS texting capability to 5 texts length, i.e. 800 characters, and the project resulted in the development of software enabling any member of staff to communicate with any student/student group "without the need for exchange of mobile phone numbers." (Brett, 2008) Despite the low 'opt-out' rate (just 73 from 1121 students) a significant number of students had negative or neutral reactions: 95 vs 27 found the texts to be "useful" but with 70 undecided; 67 vs 49 (70 neutral) considered the text messages "helped my learning"; just 80 compared to 67 (60 neutral) "like using my phone for mobile learning". Only 20% of students who received formative quiz style messages completed them, 47% engaged with but did not complete the assessments although 47% of respondents claimed "taking part in a quiz (or many quizzes) helped my learning." Discontent arose from: sensitivity regarding "intrusion into personal time"; "culture of immediacy" i.e. students felt texts should be responded to immediately (unlike emails which can be 'mulled over'); "costs"; "lack of perceived pedagogic benefit" perhaps due to the novel 'quick quiz' nature of the texts. Despite concern over costs, students expressed a desire to be able to text tutors particularly for e.g. situations

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whereby they might be late for a lecture. Where students felt texts were helpful was for administrative communications and learning support. (Brett, 2009)

Attesting predictions of BECTA (2008) concerning hand held games consoles and their ability to support rich e-learning, a unique project (HANABI), developed at the University of Edinburgh, exploited the educational potential of modern gaming devices by supplying Nintendo DSi consoles to third year students studying for an MA Honours in Japanese for use on their exchange year in Japan. The devices enabled: creation of an online student community; connection across the host institution and thirteen Japanese universities; provision of Japanese language learning exercises; swift feedback; student monitoring and support; sharing of both written and spoken Japanese between peers and tutors (Narumi-Munro, 2010). Preliminary feedback from HANABI exposed mixed feelings. Fifteen responses, from a possible 23, were collated from an online student questionnaire. Nine respondents had participated in the Nintendo DSi language exercises: five "keen" learners used the DSi regularly (twice weekly or more), engaged in other activities (gaming, hobbies etc.) and responded quickly to tutorial activities; four "moderate to low" users responded to some exercises. Four "keen" and one "moderate" user owned and were familiar with Nintendo DS consoles. One non-user had prior experience, however, due to problems with the study environment, i.e. had to "pay for coffee" in order to obtain a connection, did not engage. Only one respondent found "responding to the tasks…too difficult", main barriers cited were "lack of time due to heavy workload at the Japanese Universities", "busy social life", "difficulties in accessing/connectivity", "no interest in using a DSi" with one student protesting, "*It is a child's gaming system and having to access it in academic buildings is embarrassing…"* (Hemmi et al, 2010)

Mobile learning need not be large scale or involve novel technology. In a situative learning initiative at Bangor University fifty-seven, mainly female with fifty percent mature, student nurses were provided with laptop computers with a wireless local area network (LAN) for use at the University and a modem link for use on placement and at home. "Student nurse training, and nursing in general, is an oral-based discourse usually conducted face-to-face in a ward or practice environment" thus "students were used to conducting discussions, but not in an online environment". Colloquia software was provided for the purpose of discussion and a web browser for access to resources. Templates were provided to assist students in "building a body of evidence" of their nursing skills and students worked in groups of 8 to 10 for the purposes of discussion. The project aimed, in addition, to develop the students' ICT skills and confidence. (Nicholson, 2008)

The progression of mobile learning projects as above and at other UK, and worldwide, Universities, prompted the following research into how mobile learning might be integrated and supported locally.

Research

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The research focuses on observations regarding current work with mobile technologies and patterns of usage and success to form a hypothesis regarding what might work at the University.

Research questions are:

1. Can mobile devices, including students' own, be exploited to enhance and diversify learning?

2. Where might the employment of mobile learning be beneficial and appropriate and how might the institution's virtual learning environment, Blackboard, support its deployment?

3. What is the current level of interest in, involvement in and awareness of utilising mobile devices for teaching and learning and what are the perceived or encountered barriers?

4. What tools and technologies are available that could be affordably and feasibly employed to support mobile learning?

5. How can mobile content and devices support diversity in learning styles and abilities?

An online, anonymous survey was used to determine the level of staff involvement, at the University, and gauge academic staff attitudes, confidence/skill levels and willingness to engage with m-learning. Respondents, who have employed m-learning techniques, were given the option to volunteer for a follow-up interview

A subsequent student survey was emailed to all students regarding student usage of mobile devices and opinions concerning mobile services students would, or would not, like the University to offer.

92 members of staff, representing roughly 12% of the academic staff population, responded to the staff survey, distribution as below:

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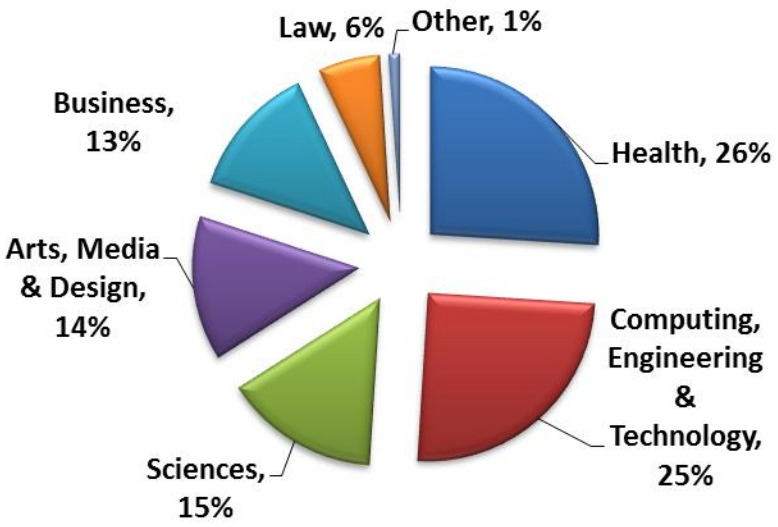

In addition six members of staff agreed to subsequent interview: 2 FCET (Faculty of Computing, Engineering and Technology); 1 Law; 1 AMD (Arts, Media and Design); 1 Business; 1 Health.

Contributors to the survey comprised a total of 77 lecturers, mostly senior (44) with some principal (8), 4 Professors, a Director and an E-learning facilitator. 67% being full time and 33% part time.

28 contributors responded positively to having used mobile technology or mobile accessible content in a teaching and learning context with their students: 8 Health; 7 FCET; 4 AMD; 4 Business; 2 Law; 2 Sciences and 1 International Student Office, 36% being in the 30 to 40 year age bracket, 29% 40 to 50 years and 36% over 50 with equal numbers of male (13) and female (13) participants reporting having engaged with m-learning.

Popularly used devices were digital media (MP3) players (12), mobile phone (9) and Smartphone (7). Tutors used mobile content with student cohorts from less than 10 to 100+ but mainly between 10 to 30 students with content mainly provided for traditional full-time students but also for part-time, distance, work-based and international. Most tutors had provided podcasts or mp3 audio or video material for their students, via Blackboard, YouTube or iTunes U, with some having used texting as a way to communicate with students and/or encourage students to communicate with one another.

1,612 students responded to the student survey with 1,365 completing it. Most responses, 35%, came from Faculty of Computing, Engineering and Technology:

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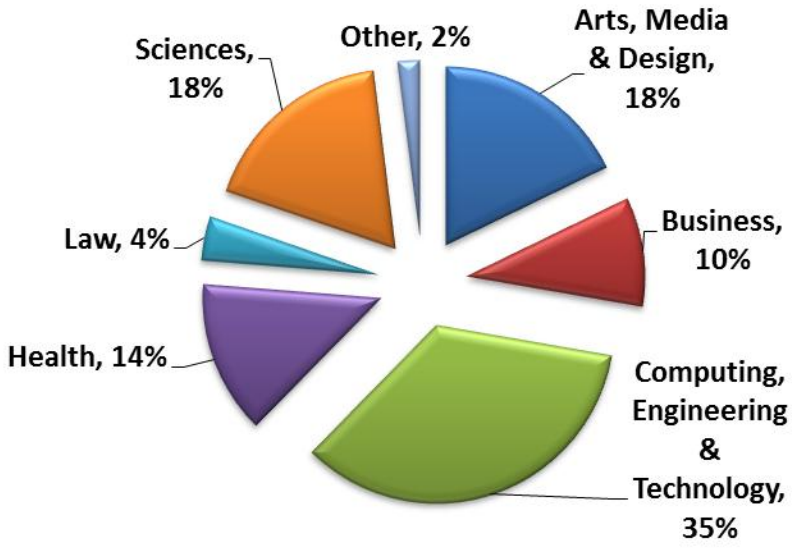

Respondents were near half female (47%) to half male (52%) with most being under 30 years of age (79%) and full time (82%). 74% of students were studying primarily face-to-face modules, with just 8% mainly online and 17% combined/blended.

95%, of 1,599 students, own a mobile phone with 60% or more owning an mp3 player, laptop, digital camera or gaming device. 37% owned a Smartphone[1]. The least popularly owned devices were iPod/ iPod Touch (29%), digital audio recorder (16%), palmtop/pda (4%) and e-reader (4%).

The majority of 1,567 respondents (70%+) have internet access on their phone with 29% having no access or being uncertain. Laptops are popularly used for engaging with social networking sites (1,366), instant messaging (1,049), uploading media (video/photo) (1,309), watching videos and live TV (1,323), using wikis/blogs (1,043), downloading podcasts (619), participating in online discussions/chat rooms (886) and maintaining own blogs/websites (540). Less commonly, mobile phones are used for access to social networking sites (820) and uploading video or photo content (522). Smaller numbers of students use phones for other functions and use other, e.g. gaming, devices, for the functions listed above:

The majority of respondents (in excess of 1,290), in keeping with Brett (2009) findings, are interested in receiving course related information via their mobile device, e.g. exam and course timetables, deadline notices, messages concerning course. A large number (1,236) would also find accessing Blackboard useful or very useful. Supplementary information, such as alerts relating to IT services, library, campus maps, pc availability, University directory and fee information was also considered valuable.

A frequently expressed concern, for staff, and most expressed by students, concerned frequency, timing, quantity and expectations regarding responding if tutor to student,

[1] A Follow up student survey (December 2011) has indicated that smart phone ownership has increased by 35% to 72%. This has had the effect of up to 6% increase in using mobile phone for various activities such as social networking.

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and vice versa, texting were to be introduced. The perception of a "culture of immediacy", as documented by Brett (2009), is evident amongst the students, one survey respondent commented "It [SMS texting] cannot be used as a mechanism to ensure students receive information instantly and respond instantly, outside of university hours."

Tutors were concerned with overload with regard to dealing with text responses in addition to email:

"It's bad enough dealing with emails without adding all this lot on top." (staff survey comment)

Horstmanshof (2004) reports this attitude as pertaining to "Older, more traditional colleagues" who complain "they are already swamped by burgeoning email inboxes" and "label the approach as 'mothering'" warning that "it is likely to lead to dependency." However, there is little evidence from the staff questionnaire to suggest there is more negativity amongst mature colleagues, indeed a significant number of respondents (18) over 40 are, or have been, actively involved with m-learning, some of whom (8) have specifically used texting.

In relation to the use of mobile phones, both staff and students expressed concern regarding the "blurring" of the "line" between academic and personal life. In addition one tutor felt that the "closeness to leisure activities might make it appear less important." Wang & Higgins (2006) state, "Mobile phones will mainly be used for communications with other people, not for learning purposes" and Traxler (2010) purports, "These devices are personal, universal and closely linked to identity".

For educators to infiltrate students' personal communities could be viewed as an unwelcome intrusion, indeed many students (57) and a number of staff (5) specifically expressed concerns regarding privacy from both their own and their recipients' point of view. In addition 43 tutors (against 17, 19 neutral) responded positively to "Making use of students' own devices, such as mobile phones, can be viewed as an intrusion and brings up privacy issues." However, as with our non-digital lives, there is perhaps a balance to be struck and mutual respect to be developed.

Despite reservations, from both sides, a number of staff (15) have employed (or are not averse to) texting and a large majority of students are happy to receive texts from tutors. Slightly less student respondents are happy to text/respond to tutor texts:

	Yes	No	Maybe
I would be happy to receive texts from my tutor	957	147	322
I would be happy to text my tutor	936	188	302

Equity of access, regarding device ownership, affordability and technical ability (JISC, 2005 & Corbeil & Corbeil, 2007) are concerns shared by both staff and students. Students, acknowledging the lack of standards between devices (Traxler, 2010),

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expressed that materials should not be device specific, and tutors were concerned that some of their students might not be able to access materials designed for mobile devices:

"I'm concerned that students might not be able to afford the technology - not all students have up-to-the-minute mobile phones or iPods" (staff survey comment)

However, m-learning related costs have not proved a major inhibiting factor. Although staff expressed concerns regarding device purchasing and operating (e.g. sms texting) costs for students, only one tutor specifically expressed concerns relating to affordability for staff:

"students usually have better equipment than we can afford" (staff survey comment)

For students, cost (of receiving/responding to learning related materials) was a significant concern (34 specific cost related comments) but not as much as other issues of information overload, privacy, security and accessibility.

Low awareness of the possibilities, how mobile learning might 'fit' with their subject and availability of guidance have hindered uptake:

"I feel that it would be more suitable for some subjects than for others" (staff survey comment)
"There is a low awareness" (Interviewee 2)
"There isn't much guidance or knowledge" (Interviewee 4)

There is some belief that m-learning constitutes only "superficial" or "lightweight" learning.

Practical technology related concerns were evident, i.e. connectivity and signal availability, and dissatisfaction, amongst both students and staff, regarding the University's Airnet WiFi system is palpable:

"There are loads of hotpoints … but if i'm walking from one place to another, my phone keeps dropping the signal" (student survey comment)
"the fact that Airnet is so bad so we cannot really use the kit to demo much…" (staff survey comment).

Students, and staff, also reported difficulties with connectivity when overseas or in broadband poor areas.

There is considerable interest, amongst both staff and students, for pursuing mobile options for Blackboard. 93% of staff are either definitely or "maybe" interested in providing mobile content for their students via Blackboard and interviewed tutors were particularly interested in podcasting and communication (such as texting) options. Access to Blackboard ranked 3rd amongst potential mobile services students most desired, surpassed only by "course information, deadline notices and messages about course" and "exam and course timetables".

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Although 133 students specifically stated their preference not to receive learning content via their mobile devices, 292 students explicitly declared they would be happy mainly for reasons of convenience and improved communications:

"yes, i'd be extremely happy as i could then check my emails and blackboard on the go instead of walking over to the library to check them."

"yes it would make communication a lot easier and a lot quicker and effective" (student survey comments)

Conclusions

Course and supplementary, such as library and IT, information provision would potentially prove popular with students. In addition most students, albeit with reservations, are not averse to receiving course related information and alerts via text. Recurring concerns, for both students and staff, of privacy and security; volume, frequency and timing of messages; expectations regarding student responses, need to be addressed.

There is little evidence of stimulating, interactive and engaging teaching and learning with mobile devices akin to projects described by Dale & Povey (2009), Narumi-Munro (2010) and Nicholson (2008). Current provision resides mainly in the area of non-interactive instructional and informational audio and video. Advantage is not being taken of the "portability" and "spontaneity" (JISC, 2005) m-devices offer in particular with reference to less available students such as work based, part time and distance. The provision of passive recorded learning materials is unlikely to support the diversity of learners studying at the University and could account for some lack of understanding, and enthusiasm for, m-learning amongst the student population.

There are pockets of experimentation with mobile accessible content but no coordinated institution-wide initiative is evident. While JISC (2005) advise, "Building a 21st century model of learning involves all members of the institution in a process of change that requires more than short term, small scale projects", they also acknowledge, "mobile technologies can first be deployed in niche areas where the gains and drawbacks can be experienced with less impact." Small scale, not dissimilar, projects are taking place throughout the faculties but corroboration and inter-faculty dissemination is sparse thus, as an institution, progress towards workable solutions is inhibited.

For students to fully engage with learning there needs to be obvious benefit, "as with all technology but especially a new one, the use parameters need to be negotiated with learners. This means an explanation of its value, an explanation to ensure full learner awareness of the technology and the learning benefits of engagement" (Brett, 2008). Involving students in the development of a project, from the beginning phase through to evaluation, is more likely to generate positive engagement (Lee & Chan, 2005). Minimal learner involvement in mobile material development might lead to a casual attitude to its use and, for traditional learners, a more methodical approach might be appropriate: "In an m-learning environment, the lack of a firm framework tends to encourage laziness;

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therefore a strict self-discipline, which many adolescents lack, is required" (Wang & Higgins, 2006). Nicholson (2008) advises the setting of "ground rules" and negotiating a "learning contract with the student" and, in retrospect, suggests activity might be more prolific if assessed. Students have expressed dissatisfaction when time and effort dedicated to a learning activity has not contributed directly to their summative assessment. (Dale & Povey, 2009)

Student feedback from other institutions has been largely positive (Lee & Chan, 2005, Brittain et al, 2006, Nicholson, 2008) and, where reactions have been mixed, students have appreciated the privileged position afforded them:

"students were excited by the prospect of creating podcasts as this was a new type of activity that they had not previously engaged in." (Dale & Povey, 2009).

Academics need access to support and resources including case studies, guidance, advice and training and students require support and inclusion to make m-learning work.

University-wide awareness should be encouraged to break down unnecessary University, faculty or individual imposed barriers such as those pertaining to culture and resistance to change (Brittain et al, 2006; Traxler, 2007). However, m-learning cannot be enforced, but offered as an option to be implemented where appropriate and where tutors have the confidence and facility to execute effective learning activities that are relevant and align with realism, learning outcomes and ultimate assessment.

University policies must be negotiated and implemented regarding mobile access to University networks (JISC, 2005), terms of communication (Brett, 2008), and external hosting of in-house developed materials e.g. on sites such as YouTube and iTunes U. A University policy for sms texting might be deemed too restraining by staff and students who wish to keep communication channels open beyond the working day. An alternative solution might be to provide guidelines and allow tutors to form their own agreements with individual students and cohorts. However, it is clear that negotiated terms should be adhered to, staff and student privacy respected and an "opt-out" option made available

Younger students already exploit the interactivity and share-ability offered by web 2.0 technologies, such as blogs, wikis and image sharing. Their interest and expertise provides scope for potential m-learning experiences (Dale & Povey, 2009). Mature students might feel disadvantaged by tutors engaging such methods, who may be viewed as favouring traditional students. However, students (of all ages) bring different skills and experience to University and it could be argued that learners at higher education level, should expect and be prepared to learn new skills. Universities are also beginning to offer alternative options for learning and assessment providing students with choice and control. Waterfield and West (2010) argue that "Accepting and welcoming the diverse student population requires that staff take cognisance of the breadth of student cohorts and develop and deliver a representative curriculum … that reflects the complex mix of individuals that make up a class in a programme". The Waterfield and West auditing tool (2011) provides a template for Universities moving towards inclusive and diverse assessment.

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Moving beyond the provision of recorded materials into the realms of interactivity, collaborative learning, problem solving and personalised feedback might seem daunting to the novice practitioner. Projects, such as HANABI (Narumi-Munro, 2010; JISC, 2010b, Hemmi et al, 2010), using specialist equipment and a dedicated team appear unreachable, however, more attainable ventures, such as heritage podcasting (Dale & Povey, 2009), can be deployed using inexpensive equipment (such as Flip camera) and relatively basic training.

Learning solutions that take advantage of students' own devices should be cross platform i.e. widely accessible from commonly owned devices. While this might seem somewhat preventative, previous case studies (Dale & Povey, 2009; Brett, 2008; Nicholson, 2008) have demonstrated that specialist tools are not always necessary.

With more innovative use and options developed through add-ons, such as Baylor Podcast and ConnectYard (Blackboard, 2010a), the University's VLE could prove a useful platform for the hosting of potentially m-learning resources. Considerable interest, from both staff and students, for mobile Blackboard options justify development in this area, however, the cost of incorporating Blackboard Mobile fully, i.e. Blackboard Mobile Central (Blackboard, 2010b) and Blackboard Mobile Learn (2010c), could prove prohibitive. Other, possibly more cost effective, options such as CampusM (oMbiel, 2009) for hosting University and course information and RedHalo (RedHalo, 2011) for collaboration and hosting of learning materials and personal learning spaces could be considered by the University.

Providing tutors with guidance, awareness, tools and training, and enlightening students to the benefits that might be derived, empowers the former to make informed decisions about m-learning and how it might fit with their teaching and the latter to judge how they might benefit from embracing m-learning opportunities.

A profitable starting position, in terms of institution-wide engagement would be to provide mobile available supportive resources such as timetables and exam dates. "The introduction of mobile and wireless technologies in a phased process, starting with the development of resources on a learning platform … is more effective than uncoordinated experimentation" (JISC, 2005) This appears to vie with the notion that mobile technology should first be deployed in niche areas (JISC, 2005), however, outputs from "niche area" projects should be brought together to inform practice alongside "senior management" supported development of University wide initiatives culminating in an institution wide "drive towards innovative practice" (JISC, 2005).

M-learning pedagogies are evolving and it might not be appropriate to apply methods pertaining to a "computer based environment" (Brett, 2008) to the more organic, less static, m-learning environment. There is no doubt that with reliable technologies and academic willingness, m-learning can support a range of learning styles: "connectivity on location enables more emphasis on discovery-based, problem solving and collaborative learning" (JISC, 2005); "Text messaging is an example of a student centred, personal approach" (Horstmanshof, 2004); "Technological innovations in the form of portable

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media players…have enabled learners to adopt a more active approach to the creation of knowledge…" (Dale & Povey, 2009).

While some may not feel ready for a 'mobile revolution' in higher education, the impact m-devices have on student life and the potential for broadening learning cannot be ignored. Worldwide, HE institutions are experimenting with and exploiting the power of m-learning: "Universities and colleges will continue to work in fiercely competitive markets, regionally, nationally and globally and will have to exploit innovative mobile technologies within their corporate strategies" (JISC, 2005, p.44). It may be a concern that less technical students and staff might feel estranged, however, students and staff confident with technology already have an advantage (i.e. they are exploiting the 'edge' their technology gives them). It is a responsibility of the institution to bring the less technical 'up to speed' rather than shy away from advances for fear of displeasing those who might choose to eschew.

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