How students in Higher Education use their mobile phones for learning

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Abstract
This paper reports on a project that is conducting empirical research to find out how students in Higher Education are using their mobile phones for learning. Data of student mobile phone ownership and their attitude to using their mobiles for learning has been gathered through a student survey. This has been followed-up with in-depth studies with a smaller number of students. The paper presents the results from the survey, and 3 in-depth case studies of why and how students are using their mobiles for learning. Such research gives valuable insights into students' practice and attitudes towards mobile learning, helping us to design effective mobile learning activities that capitalise on what they already do, and can potentially do with their mobile phones.

Keywords
Mobile learning, students' mobile phones, Higher Education

1. INTRODUCTION
It is now accepted that mobile devices have a number of important characteristics which make them attractive from an educational perspective, including increasing portability, functionality, multimedia convergence, ubiquity, personal ownership, social interactivity, context sensitivity, location awareness, connectivity and personalisation (Pachler et al, 2010). And much research has taken place documenting mlearning pilots and projects, and in developing theoretical frameworks to scaffold mobile learning (e.g. Kukulska-Hulme et al, 2009; Laurillard, 2007). However, there is a lack of research into how students are actually using their own phones for learning outside of the formal classroom.

This paper presents initial results from a small project funded at London Metropolitan University (London Met) to explore in depth how students are using their mobile phones to help with their learning. London Met is an inner-city University which encourages widening participation. As a result, the student body is diverse: there are many mature learners (many with children) who are returning to education and international students who do not speak English as their first language. Most students also now work to fund their studies. Hence tutors are actively seeking strategies to engage learners both inside and outside the classroom. For the project, initial data was gathered from a student survey of mobile phone use. This was followed-up with in-depth studies with a smaller number of students to obtain a greater understanding about student practice and their attitudes towards mobile learning. Three students were loaned Flip Video camcorders to record their daily use of their phone for learning activities. Afterwards, they each participated in a follow-up interview. This has resulted in 3 case studies of student-initiated mobile learning, which provides much insight into the functions of their mobiles that they use, and the types of learning activities that they use them for. More importantly, they help us to understand students' attitudes towards using their mobiles as a tool for learning. The 'Learning on the move' website contains all the outcomes from the project, including the survey results, student videos and case studies [www.londonmet.ac.uk/learningonthemove/index.html].

2. BACKGROUND
To put this current work into perspective, the authors of this paper have been involved in a number of mobile learning initiatives and pilot projects at the university over the past few years. These include: a student mobile phone survey conducted over 5 years; lending mobile phones to MA students to complete an out-of-classroom assignment, which included the provision of a phone-based checklist to remind them of their task; the provision of an online 'mediaBoard' for students to post images and discuss their groupwork in support of a field trip and assignment (Cook et al, 2006); the provision of study tips via SMS; the creation of learning objects for mobiles (Bradley et al, 2009); and the use of TXT messages in lectures to increase student participation and engagement (Bradley et al, 2010).

Much of our work aims to understand and improve the learning experience and help a diverse body of students to succeed at University. Evaluations and lessons learned from previous work, has shown that students are motivated to use new technologies (and in particular mobile phones) for learning activities, and that carefully designed mobile learning activities can engage students to participate in them (Bradley et al, 2010; Bradley, Smith & Cook, 2010). Once engaged within the learning process, they can be motivated to participate and stay engaged. We know from our student survey conducted over the last 5 years that all students now own a mobile phone, and that the phones they have are increasingly sophisticated (Bradley and Holley, 2010). It also tells us that students are open to the idea of

anytime, anywhere learning, that enables them to schedule their own learning within their busy lives, whenever and wherever it is most appropriate.

This research stems from the desire to be able to utilise the powerful mobile phones that students now have with them all the time - devices which they know how to use, and already use for a multitude of tasks in their everyday lives. We agree with Schuck et al, that given the ubiquity of mobile devices, an imperative has arisen for educators in Higher Education to familiarise themselves with the affordances of mobile technologies for learning so that they are able to capitalise on their students' usage of these devices for effective learning (Schuck et al, 2010). Future projects can utilise students' own technology, avoiding the need for the University to provide it and thus a whole set of operational issues (cost, training, support, adoption of use etc.) which many earlier projects experienced. However, we first need an understanding of students' attitudes to and their uses of their mobiles for learning before we can design effective mobile learning activities that will bring mobile phones into the blended learning arena, including them within learning scenarios, rather than excluding them.

The next section presents the results from our student mobile learning survey. This is then followed by the three case studies of student mobile phone use. In the final Discussion and conclusions section we discuss the findings and key emerging issues, and the implications of them on our future work.

3. SURVEY RESULTS: STUDENT MOBILE PHONES AND THEIR USE

The first stage of the research was to conduct a survey with students to find out what mobile phones they have, what their attitudes are towards using them for learning, and what they actually use them for. A short paper-based questionnaire was given to first-year students taking a core business module, 'Studying Marketing and Operations'. The results are presented in this section.

3.1 The students and their mobile phones

74 students completed the questionnaire. All 74 students own a mobile phone. 73% of the students were female, 28% male. Table 1 shows their age profile.

Table 1: Age profile of students

Age range	18-20	21-25	25-30	30-35
% respondents	61%	33%	5%	1%

No students were aged over 35, and the majority 61% was 18-20, with another 33% aged between 21 and 25. The gender and age characteristics reflect the average make-up of the module cohort, being predominantly female and in their late teens/early twenties (a significant number of fashion marketing students study this module).

63% of students have their phone on a monthly contract, and the other 37% use 'pay as you go' (PAYG). Contracts usually provide inclusive call-time, SMS messages and data download. The implication is that if students have these included within their monthly tariff, they will be less concerned about the costs incurred of using their phone (financial concerns are common amongst our students).

Table 2 shows how long students are likely to keep each handset for. This provides a measure of how frequently new devices are acquired, each one generally having greater functionality than the previous one.

Table 2: Length of time students keep a phone for

Time period	6 months	12 months	18 months	As long as possible
% respondents	1%	37%	27%	35%

37% keep their phone for 12 months, but 35% like to keep their phone for 'as long as possible'. 27% keep a phone for 18 months (the current average length of a contract).

The range of handsets owned by the students is diverse: 72 students cited 37 phone models from 9 manufactures (1 student had 2 handsets and several did not specify a precise model). 23 students owned 10 specified Nokia models; 14 owned 5 Blackberry models; 14 owned 9 Sony Ericsson models; 9 owned 3 Samsung models; 6 owned 2 Apple iPhone models; 6 owned 5 LG models; one student each owned an HTC, T-Mobile and a Vodaphone. About 80% of these handsets can be classified as Smart Phones (where this can be determined from the model information supplied, as some don't specify precisely what they have). Whilst there is not an industry standard definition of a Smart Phone, we have taken this to mean a high-end phone that includes web browsing and email. Figure 1 below shows the phones that students own by make, with the number of Smart phones indicated.

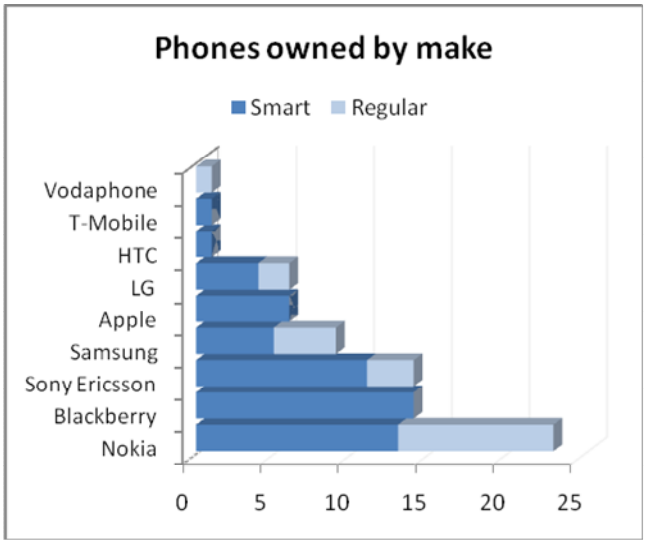

Figure 1: Phones owned by make

This data is important, as it shows the diverse range of phones that would have to be supported in any mobile

learning initiatives.

The real indicator of what students can do with their phones is shown in Figure 2, features of students' mobile phones.

Colour screens are now standard for 97% of the students. The ability to be able to capture and generate content is also a possibility for a high proportion of students: 96% have a camera, 86% can record video and 84% can record audio/voice. The ability to access data networks and share data is also becoming more commonplace: 80% of students can access the Internet from their mobiles, 50% can access WIFI, 91% have Bluetooth, 46% 3G and 50% GPS. WIFI is important as it enables students to have free access to the Internet and other data sources where a freely-available WIFI network is available.

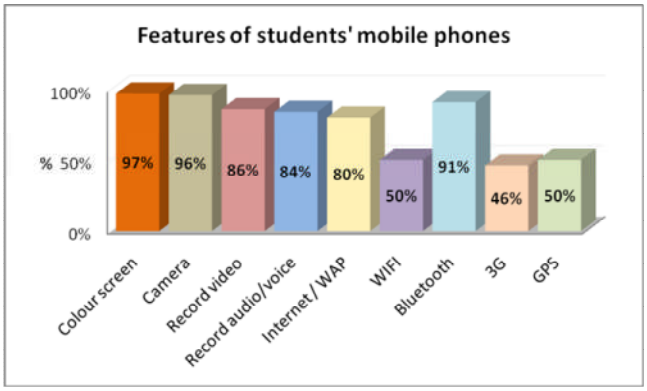

Figure 2: Features of students' mobile phones

3.2 Students' attitudes to using their phones for learning

Three questions were asked about their attitudes to using their mobile phone for learning and being contacted by the University. The results to these questions are discussed in the 'Discussion and Conclusion' section, as insights from the students interviewed help us to better understand the student viewpoint. Table 3 shows the responses to the question 'How much is the ability to learn at any time and in any place important to you?' which was designed to find out about their attitude towards flexible learning, and therefore potentially mobile learning.

Table 3: How much is the ability to learn at any time and in any place important to you?

Extremely important	1	2	3	4	5	Not at all important
% respondents	30	26	29	4	5	

Adding the results at the positive and negative ends of the scale together (1 + 2 and 4 + 5) makes it easier to interpret the results. 56% think it is important to be able to learn at any time and in any place, 29% are unsure (choosing '3' in the middle), and only 9% think it isn't important.

Table 4 explores the question 'How useful would it be to access learning materials via your mobile?', as earlier research explored developing learning objects for mobiles.

Table 4: How useful would it be to access learning materials via your mobile?

Extremely useful	1	2	3	4	5	Not at all useful
% respondents	29	30	16	12	13	

59% think it would be useful to access learning materials from their mobile, 25% think it wouldn't be useful, and 16% are unsure.

Figure 4 shows the responses to the question 'How would you view the university contacting you via your mobile for learning purposes?' which aimed to find out how 'personal' students viewed their mobiles and whether such activities were seen to be intrusive.

Table 5: How would you view the university contacting you via your mobile for learning purposes?

It would be a positive aspect	1	2	3	4	5	It would be a negative aspect
% respondents	26	24	29	10.5	10.5	

50% gave a positive view, 29% are unsure and 21% have a negative view, so student opinion is divided on this issue.

3.3 How students use their mobile phones for learning

The final question was 'Do you currently use your mobile phone to help with your learning, and if so, what do you use it for?'

22 students (29%) reported using their mobiles for learning, citing 34 different uses. These uses have been grouped into 7 categories in the table below: conducting research/getting information, communicating, generating content/artefacts, using tools/applications, organising, notetaking and 'other'.

Table 6: How students use their mobile phones to help with their learning

Category and mobile phone use	Total uses
Conducting research / getting information	**12**
Internet (4 students)	
Google (3 students)	
Research (2 students)	
Researching on the Internet	
Accessing info pages	
Search information	
Communicating	**6**
Email (2 students)	
Saving emails	
To receive emails	
Contacting group assignment members	
Fashion Facebook group	
Generating content / artefacts	**4**
Take pictures/photos (2 students)	
Take pictures of artworks	
Voice recording	

Using tools /applications	**4**
Calculator (3 students)	
Microsoft Office	
Organising	**3**
Organiser	
Check my exams	
Putting reminder alarms for meetings	
Notetaking	**1**
Write notes	
Other	**4**
Accessing learning materials	
Presentations	
Record presentations	
Transport files (PDF, Word, Powerpoint …)	

The most common category of use was 'conducting research and getting information', cited by 12 students. Of these, 10 involved using the Internet, and 2 simply cited 'research' which probably meant using the Internet. Data from the last 3 years of our survey (since the question about mobile learning use was introduced) shows that use of the Internet for research has increased the most, and has overtaken communication with this year's students (Bradley and Holley, 2010). The 'communicating' category saw the next highest number of instances, with 6 uses: 4 used email and 2 others used their mobile to keep in contact with other students (one via Facebook). Interestingly, no students mentioned using text messaging. 4 students used their mobile for 'generating content/artefacts', 3 for taking pictures or photos and 1 for voice recording. In the 'using tools and applications' category, 3 used the calculator and 1 Microsoft Office. The use of Microsoft Office is interesting here, as for this student their mobile phone is clearly taking over some of the functionality of their PC (this student owned a Blackberry Curve). 3 students used their mobile for organising their studying, citing using the organiser, checking exams, and setting reminder alarms for meetings. One use was registered in the 'notetaking' category. Four 'other' uses were cited: accessing learning materials, presentations, record presentations and transport files.

4. CASE STUDIES OF STUDENT MOBILE PHONE USE FOR LEARNING

The second stage of the research was to lend 3 students Flip Video camcorders so that they could capture their mobile learning activities. Afterwards, students were interviewed, to further explore their practice, and they also completed the questionnaire so that we had the same background information as the other students. From the video footage and information provided in the interview, a case study has been compiled for each student, illustrating their mobile learning activity, and attitude towards it.

4.1 Case study 1: Sam

Sam is a first-year student at London Met, studying Foundation art, media and design. He is male, between 18 to 20 years old, and has a Blackberry Curve, which he has only owned for about 2 weeks (previously he had a Sony Ericsson which was a hand-me-down). He has his mobile on an 18-month contract, which gives him unlimited Internet access and a large amount of inclusive call time and texts. He has not been involved in any mobile learning activities during his first year at the University, saying "if I have used it, it would have been something that I just wanted to do, not advised to do".

He uses his phone for the following learning activities:

- Setting reminders in the calendar and using the clock and alarm to help organise his studying and his schedule.
- Using the camera to capture images and notices and things to remember when he's at art galleries and exhibitions. These are mainly for reference so he can browse through them at his leisure, and he may go back and take higher quality photos with his camera to use in his course notebook or for coursework (he doesn't consider the camera on the Blackberry to be of sufficient quality).
- Using the voice recording to record lectures, if he thinks it will be important, so he can replay it later.
- Communicating with other students, mainly via phone calls as he has a lot of free call time. He also uses Blackberry Messenger to communicate with other students with Blackberry's, as this is free.
- Using the Internet and Google to look up necessary information.

His most common use is "probably the calendar, because that is really useful, because my organisational skills aren't very good, so it does help to have a little buzz when you need to do something".

He doesn't use his mobile for writing notes, apart from entering dates into the calendar to set reminders for things he needs to do: "I just write a brief line in the calendar saying I need to do this by that date." However, now he has a Blackberry, he could see himself using it to take notes in the future, because it has a full alphabetic keypad, unlike the limited keypad on his previous phone. "Yeah, I could definitely see myself using it for notes in the future." He doesn't use it at the moment because he's usually got pen and paper and it's easier to use that.

On a daily basis, he uses his phone most for calling people, as he has lots of inclusive minutes. He also uses Blackberry Messenger, and plays games when he's sitting on a train or somewhere.

He uses his mobile to help with learning because it is "convenient". "Because it's convenient, I mean I've got it in my pocket 24 hours a day, it's always there, and now I can use the Internet … it's just convenient." He uses his mobile for learning "when necessary" (he thinks that the ability to learn at any time and in any place is important). He probably engages in mobile learning once or twice a day on the days when he's at the University (about 3 or 4 days a week), and less on days where he's not there. Regarding the location of most of his mobile learning activities, he tends to carry out activities at gallery visits and exhibitions, during lectures for recording them or entering information such as dates and deadlines into the calendar, and at home, for checking notifications of forthcoming deadlines, tasks etc. to see what he has to do and bases his homework around the deadlines. He tends to drive into University, and therefore doesn't use his mobile whilst travelling.

He knows that many of his fellow students also use their mobiles for learning (he wasn't able to give a percentage), and said that the numbers were increasing because mobile technology and the

phones that they have are becoming more sophisticated, saying you can do much more now than even last year. However he acknowledged that people are different and how much they used their mobile would depend on what phone they'd got. About half the students have a Blackberry, partly because it's free to do Blackberry to Blackberry messaging and you can access Facebook from it too. He also believes that mobile phones are no longer just for calling and texting, and have become a fashion accessory, and that everyone wants to have the latest phone. He reckons that he uses his phone more now than other students (because he's just got the new, more sophisticated one). As an example, he mentioned that one student listens to music on his phone when he draws to help him concentrate. He thinks that all the students on his course will have used their mobiles at least once during the year for learning purposes.

When asked if the University could do anything to make it easier to engage in mobile learning, he said maybe send texts about deadlines as reminders, such as "have you done the work, do you need any help, if so contact this number".

4.2 Case study 2: Shriya

Shriya is a first-year International student from India, studying Event Management and Public Relations. She is female, aged between 18 to 20, and has a Blackberry Curve which she has had for about 2 months. She uses 'Pay as you go' and pays £5 per month for unlimited Internet access. She has not been involved in any mobile learning activities this year at the University, but she did experience mobile learning on a previous short course, 'Photography and personal styling' at the London College of Fashion. During that, the tutor encouraged them to use their phones to take photographs and exchange ideas. Everyone was very enthusiastic to use their mobiles, and it was because of this course that she bought a good mobile phone (she wasn't interested in them previously because she didn't realise the benefits). She also realised that using mobile phones in such a situation had the power to "hook" you into the learning activities.

She bought a Blackberry because it is equipped with all the Windows software. She has an Apple MacBook laptop, and finds it difficult to connect with some of the University systems (such as Webmail, the email system), whereas on her Blackberry, she has no problems and can access anything she wants. She said "I'm forced to use my phone as my main source of communication." She has started to use her Blackberry for so much now, that it has overtaken the use of her laptop.

Having the ability to learn at any time and in any place is important to her, and her Blackberry facilitates this. She thinks it's extremely important be to be able to access learning materials via her mobile. She believes that students are used to their phones and because they can now do such things, it is important. She also thinks it would be positive for the University to contact her on her mobile for learning purposes. Sending messages to her mobile would be a faster process of communication, and she wouldn't object to what the university contacted her about, as long as it wasn't in the middle of the night.

She uses her phone for the following learning activities:

- To access email. Her email accounts forward to her mobile, so emails go straight to her phone, "so you don't need a laptop to sign in and it's best when you don't have access to the net".
- Communicate with classmates, via the Blackberry Messenger (which is free amongst Blackberry users) and chat, because these are free forms of communication for her. Using this she can chat, send files and pictures and share documents for free.
- To download materials from WebLearn (London Met's VLE).
- To access Facebook. One of her tutorial groups set up a Facebook group before Easter to facilitate the exchange of work and ideas for a group project. Over the Easter holidays, many of the students travelled abroad, and 3 of them were unable to fly back to the UK in time for the completion of the project because of the Volcanic ash cloud affecting European airspace. The group was therefore able to continue with the project, and those unable to be physically present at the University were able to participate through their participation in the Facebook group. What was started as a means of communicating turned into a "life-saver" for these students.
- Access University systems, e.g. Webmail (the email system) and Evision (the student record system). As she can't access her university email from her laptop, her mobile has become the only means for accessing email now.
- She makes notes using the 'Memopad' in which you can write quick notes and attach alarms to give reminders, which can also link through to the calendar. She also uses 'Word to go' which is Blackberry's cut-down version of Microsoft Word to write reports. She will start typing up notes in lectures, and then use these as the basis of her notes and reports. These files can then be emailed, or submitted as coursework.

Her most common daily use of her phone is for Facebook, followed by Messenger which she described as a "lifesaver". For learning, she uses it most for emailing tutors and writing reports.

She uses her phone for learning because it is easier, it is accessible (always connected to the Internet and other people), you can use it anywhere and everywhere, and you don't have to carry a heavy laptop around with you. She said "it really helps you because it saves on time and money". She estimates using her phone for learning about 3-4 times a week, totaling about 20 hours.

She generally carries out her mobile learning activities in quiet places: in her room, in the park around the corner, but not in the library, because they don't allow the use of mobile phones (although a lot of students do use them). She doesn't like the concept of having to study in front of a computer, and her mobile therefore gives her more freedom to study where she wants to. Most of her learning activities are conducted in the evening, when she does most of her studying.

She didn't think that being involved in this project had encouraged her to use her mobile for learning any more than she currently does, because she was already using it a lot.

She thinks that the University could give students more encouragement to use their mobiles, for example give interactive learning sessions on how they could use their mobiles for learning. She believes that using mobile phones can get students interested in the subject more, and they are fun and help to create enthusiasm for learning. This was her experience on the short course she attended which was mentioned earlier.

She says that many students are using their mobiles for learning. She lives in a student hostel, and has noticed that many now use their mobiles more than their laptops. There is only Internet connection on the ground floor, so you've got to physically go down there with your laptop, whereas with your mobile you can do it in your room. She commented that laptops are big and heavy, and that now a good mobile phone can cost the same as the cheapest laptop or netbook. Some students now don't actually buy a laptop because of this.

4.3 Case study 3: Heidi

Heidi is a first-year International student from Estonia, studying Public Relations. She is female, and is aged between 18 to 20. She has a Sony Ericsson G502 which she has had for over a year, and uses 'pay as you go'. Her phone can access the Internet, but she doesn't use it to access the Internet because it is too expensive. She has a PC and Internet access at home and prefers to use this.

She thinks it is important to have the ability to be able to learn at any time and in any place, as it is "more convenient". For example if you're waiting for someone you can check what you have to do for your coursework. She was undecided about being able to access learning materials on her phone, mainly because she doesn't think her phone is capable to be able to access materials, but her response would be different if she had a more sophisticated phone. She thinks it would be extremely positive for the university to contact her via her mobile for learning purposes, for example, sending text messages would be good for notifications from the university about coursework deadlines or dates for presentations.

She uses her phone for the following learning activities:

- She makes notes and takes down thoughts for coursework by saving them as text messages. She finds this a more convenient way of making notes, for example if she doesn't have a pen, or when on the tube where using her phone is easier than writing down notes in a notebook. She also uses text messages to remember things, such as room numbers for lectures and meetings and to make a note of page numbers in books that are interesting when she's reading on the tube. She often has between 40-60 saved text messages on her phone.
- She sends text messages to communicate with other students. She prefers to use this method for communication because it's more convenient and it's cheaper.
- She also makes phone calls to communicate with others. She thinks this is a more convenient method of communication because you can say what you want to say faster, and it's also more effective, because people might not see the text. If she had a mobile with a contract or cheaper calls she would make calls more often rather than sending text messages.
- Taking pictures, for example of things she needs to remember, such as an equation for her Quantitative Analysis exam. She also takes pictures to use for her coursework, such as adverts on the tube, or images she wants to keep that give her ideas.
- She often uses the calculator on her phone when she doesn't have a calculator with her (she's studying statistics as part of her course).
- At college in Estonia last year, she wrote notes in Notepad on her PC and then transferred these to her phone. She had forgotten that she used to do that and for some reason has not continued this practice.

On a daily basis she uses her phone most for texting, and then taking pictures of things. For learning, she uses her mobile most for making notes and texting other students. She uses her mobile for learning because "I know I have it on me always, and I can check it always, it's better than writing in a small calendar book for me". It makes it easier to get in touch with people, and ask for advice, and makes it easier to write essays and coursework and keep up to date with what she needs to do. However, she doesn't like to set alarms and reminders on her phone as some students do, as she doesn't like her phone "beeping" all the time.

She thinks that other students use their mobiles mainly for texting and calling. One friend has an iPhone and uses it to access University systems, such as Webmail, Evision etc. She commented that other students were "amazed" at her use of making notes as text messages (it's not a common practice). She believes that she uses her phone for learning activities about "more or less the same" as other students, probably using it every other day during the week in term time, which probably amounts to about an hour a week in total.

When asked where she tends to engage in mobile learning activities, she said "everywhere actually". For example, at university when she doesn't have a pen and needs to save some notes. She will engage in mobile learning when it is appropriate.

She felt that taking part in this research project has made her realise how much she does use her phone for studying, and found it interesting to discover the different ways she uses it. She would probably use it more in the future if she had a phone that would access the Internet cheaply. If she had cheap or free Internet and a more sophisticated phone, she could see herself using it for accessing the Internet, for email, social networking, accessing Weblearn (the university's VLE) to check announcements, and other university systems. For example she was able to check her grades on her boyfriend's iPhone last semester.

She gave one example of how the University could make it easier for her to engage in mobile learning. She liked the idea of an App that would make it easy to access University systems (WebLearn, Evision, etc), because the University is Internet-based. It would save time if you could access from a phone which you carry with you everywhere, and it would be a good opportunity for learning.

Each of the case studies illustrates a very different individual use of mobile learning. The common practices and key messages are discussed in the following section.

5. DISCUSSION AND CONCLUSIONS

The student survey has provided useful background information about the current situation of student mobile phone ownership and appropriation for learning. Whilst it focuses on students from one module, it does provide a snapshot of the reality within this group of students. The results show that all the students have a mobile phone, and that the majority possess a high-end Smart Phone (about 80%). The high percentage of Smart Phones may be because a large number of these first-year students were International students who had just arrived in the country, and will have got new phones on UK networks. 80% can access the Internet, 96% have a camera, 86% can record video and 80% can record audio, clearly illustrating that students have the capabilities in their phones to engage in a wide range of learning activities.

These students are also receptive to using their mobiles for learning. 56% of students in the survey thought it was important to have the ability to learn at any time and in any place, 29% were unsure and only 9% thought it wasn't important. Our 3 case students all thought it was important.

On being able to access learning materials on their phone, 59% thought this would be useful, 16% rated unsure, and 25% not useful. Some explanations for the more reticent opinions are provided by Heidi, who herself was unsure.

Heidi doesn't believe that her current phone is capable of accessing learning materials, but would do so if she had a more sophisticated phone and it wasn't expensive to access them. This could also be true of some of our survey students: about 20% do not have a Smart Phone and 37% are on PAYG. Conversely, Sam and Shriya thought having access to learning materials was extremely important. Shriya currently downloads learning materials to her phone from the VLE, so is clearly practicing this already.

Half of the students (50%) view the University contacting them via their mobiles for learning purposes positively, 29% were unsure and 21% viewed it negatively. Our 3 case students all had a positive view, and provide more explanation on this issue. Shriya thought that contacting students for learning via their mobiles was a faster process of communication, and was happy for this to happen, providing it was not at anti-social times (she did not think it was intrusive). Sam was happy to be contacted provided it was for learning and something useful (he wasn't happy about getting 2 emails a day about an event that was about to take place). Heidi thought that receiving texts would be good, for example to remind you about coursework deadlines or presentation dates.

Our research shows that many students are actually using whatever mobile phone they have for a wide range of learning activities. Many of the learning activities cited by students in the survey are also carried out by the 3 students who participated in the in-depth study, who also contribute more detail about what they do and why they do it. Looking at the categories of use in which students are engaging in mobile learning, the following observations can be made.

The two categories with the greatest amount of use were 'Conducting research/getting information' followed by 'Communicating'. However, it is evident that the ways in which students appropriate their mobiles in these areas, depends to a large extent on the cost of Internet access and communication services (calls, text messages etc.). 12 students in the survey and Sam and Shriya were conducting research using the Internet, but Heidi does not use her phone to access the Internet, because it is too expensive. 'Communicating' was carried out by 6 students in the survey, with 4 citing email, one using a Facebook group and one contacting group assignment members (they didn't specify how). All of our case students use their mobiles for communicating, but what is interesting is the different methods they each choose, mainly because of the cost (or lack of it). For students involved in group projects (Shriya and Heidi), keeping in contact with other students was particularly important to them. Shriya uses 'PAYG' on her Blackberry but pays £5 a month for unlimited Internet access, and communicates mainly by email, Blackberry Messenger, chat and Facebook. Using Messenger is free amongst Blackberry users, and the other methods are covered by her monthly Internet payment. Heidi on the other hand, uses mainly text messages to communicate because this is the cheapest method for her, and makes calls when that would be more effective. Sam encounters fewer barriers to cost, as he has a monthly contract which includes unlimited Internet access, and a large number of inclusive calls and texts, and tends to make calls to keep in touch with others, and also uses Blackberry Messenger with other Blackberry users. So whilst the cost of communication and accessing the Internet is an issue for students, they are able to make use of the cheapest options to meet their needs.

Uses in the other categories are more likely to be influenced by what students are able to do with their device and how they have taken the initiative to use what is available. Four students in the survey and all of our case students use their mobiles for 'Generating content/artefacts' in various ways. Taking photographs to include in coursework or a portfolio was one particular use, and used commonly by Sam and Heidi, and hinted at by Shriya (she talks about sharing pictures). Shriya also uses her mobile to write reports and coursework. Another student cited voice recording but didn't say what for. Four students mentioned that they used 'Tools/applications' on their phone for learning. 3 said they used the calculator, as does Heidi for her Statistics module. One student said they used Office, and Shriya uses Blackberry's version of this extensively, for preparing reports and presentations. Using their mobiles to help with 'Organising' their learning and their schedule was practiced by 3 students in the survey, and all of our case students to varying degrees. Sam, who admitted that his organization skills aren't very good, uses the calendar and clock to set reminders and alarms to help organize his studying and schedule. Shriya also mentioned attaching alarms to notes in Memopad, to help her remember deadlines. Heidi prefers to make reminders in the form of text messages, and doesn't like to set alarms and reminders on her phone because she doesn't want her phone "beeping" all the time. All 3 of our case students now rely on their mobile to some extent to organise their learning and maintain their learning schedule. One student mentioned using their mobile for 'notetaking' in the survey, and all of our case students gave examples of this in one form or another. Shriya uses the Memopad on her Blackberry to write quick notes. Heidi takes notes in the form of text messages, which she saves to her phone to refer to later. She also uses the camera to take visual notes of images she needs to remember (such as an equation for an exam) or that give her ideas. Sam also uses his mobile to take visual notes, of artwork in galleries to look at later or go back and capture more effectively with his camera, and to capture things he wants to remember, such as notices. 'Other' uses which don't fit into one of our categories include accessing learning materials, presentations, record presentations and transport files. Sam records lectures that he thinks will be important, and Shriya uses her phone to access University systems and download materials from WebLearn (the VLE).

Focusing on what the 3 students in the in-depth study have

told us, we have an insight into why students think mobile learning is important, and where and when they engage with it. For Sam, using his phone for learning was "convenient", because it's there 24 hours a day (he sleeps with it next to him) and he has unlimited access to the Internet now. He uses his mobile for learning "when necessary", maybe once or twice a day on the days he's at University (about 3 or 4 a week). Activities tend to be located in-situ, at art galleries and exhibitions, during lectures (recording them or adding reminders) and at home for checking his schedule and what tasks he has to do. He said that any use of mobile learning was because "it would have been something that I just wanted to do, and not advised to do". Shriya uses her mobile for learning because it is easier, it is accessible (always connected to the Internet and other people), you can use it anywhere and everywhere, and prefers it because you don't have to carry a heavy laptop around with you, and you don't have to turn it on and log on to access emails. She believes that using her Blackberry "saves on time and money". She estimates using it for learning about 3-4 times a week, totaling about 20 hours. She generally carries out her mobile learning in quiet places, such as in her room, in the park around the corner, but not in the library (as they don't allow the use of mobiles). She said that she didn't like having to study in front of a computer, and that using her mobile therefore gives her more freedom to study where she chooses to. She was introduced to mobile learning on a previous course, and was made aware of the benefits, and that using mobiles had the power to "hook" you into the learning activities. Heidi uses her mobile for learning because it's more convenient and it's easier: "I know I have it on me always, and I can check it always, it's better than writing in a small calendar book for me". She says it makes it easier to get in touch with people, ask for advice, write essays and coursework and keep up to date with what she needs to do. She engages in mobile learning when it is appropriate, and says she uses it "everywhere actually". Examples she gave were at University when she doesn't have a pen and needs to write some notes, on the tube if she sees a poster to capture for her coursework or for ideas, or take notes because it's easier than finding a pen and notebook.

From comments made by these students, we can see that they are appropriating their mobiles for learning according to their individual learning needs (e.g. to facilitate group projects, generate content for coursework or for portfolios, help organize their learning, remember things, access University systems and the VLE), using the tools and services that they have available to them in their devices, and making use of what they prefer to use in their everyday practice. As Sam pointed out when asked if he was aware of how other students were making use of their phones for learning, "people are different" and individual student mobile phone use clearly reflects this, and to some extent it will also be dependent on the phone and type of contract they have. However, a wide range of mobile learning activities are being carried out, and students are resourceful in the methods that they choose to carry them out. For some students, their use of their mobile is overtaking and replacing the use of their laptop/PC.

This research helps us to better understand students' practice and attitudes towards mobile learning and therefore will help us to more effectively design mobile learning activities that build on existing student practice, and that can help to engage the students to participate in learning. It also provides an insight into the mobile phones that students have and what they can do with them, so we can design inclusive activities that a large number of students can potentially engage in.

REFERENCES

Bradley, C., Holley, D. (2010). An analysis of first-year business students' mobile phones and their use for learning. In, Creanor, L., Hawkridge, D., Ng, K., Rennie, F. (Eds). "Into something rich and strange" – making sense of the sea-change, pp 89-98. The 17th Association for Learning Technology Conference (ALT-C 2010). Held 7–9 September 2010, University of Nottingham, England, UK. Available from: http://repository.alt.ac.uk/797

Bradley, C., Weiss, M, Davies, C. Holley, D, (2010). A little less conversation, a little more texting please - A blended learning model of using mobiles in the classroom, 5th International Blended Learning Conference, 16-17 June 2010.

Bradley, C., Smith, C., & Cook, J. (2010 in press). Location and Context Sensitive Mobile Learning: The Evaluation of an Urban Education Tour, Proceedings of MoLeNET Mobile Learning Conference 2009, 1 December, London

Bradley C., Haynes R., Cook J., Boyle T., & Smith C. (2009). *Design and Development of Multimedia Learning Objects for Mobile Phones*. In M. Ally (Ed) Mobile Learning: Transforming the Delivery of Education and Training. AU Press. http://www.aupress.ca/index.php/books/120155

Cook, J., Holley, D., Smith, C., Bradley, C. and Haynes, R. (2006). A Blended M-Learning Design for Supporting Teamwork in Formal and Informal Settings. Mobile Learning 2006, July14-16, University of Dublin, Trinity College.

Kukulska-Hulme, Agnes; Sharples, Mike; Milrad, Marcelo; Arnedillo-Sánchez, Inmaculada and Vavoula, Giasemi (2009). Innovation in Mobile Learning: A European Perspective. International Journal of Mobile and Blended Learning, 1(1), pp 13–35.

Laurillard, D. 2007. Pedagogical forms of mobile learning: Framing research questions, in N. Pachler (ed) Mobile learning: Mobile learning: Towards a research agenda (Vol 1 pp 33-54) London, WLE Centre, Institute of Education.

Pachler, N, Bachmair, B, & Cook, J. (2010). *Mobile Learning: Structures, Agency, Practices*. New York: Springer.

Schuck, S., Aubusson, P., Kearney, M. & Burden, K. (2010). Mobagogy – Mobile learning for a Higher Education community, in proceedings of IADIS Mobile Learning Conference, 2010