JOURNAL OF THE
RESEARCH CENTER FOR EDUCATIONAL TECHNOLOGY

KENT STATE

Volume 4, Number 1
Spring 2008

Bridging the Gap? Mobile Phones at the Interface Between Informal and Formal Learning

Professor John Cook
London Metropolitan University

Dr. Norbert Pachler
Institute of Education, London

Claire Bradley
London Metropolitan University

Abstract

This paper reports on a study of the use of high-end mobile phones for off-site and on-campus mobile learning. The aim of the study was to investigate how mobile devices are being integrated by learners in their informal/private 'space' and what use they make of mobile devices in formal learning contexts. We view formal and informal learning as being part of a continuum of a multi-dimensional clustering of informal and formal learning activities rather than positioned in an either-or relationship. The methodology used for the study draws on narrative and case-based approaches underpinned by grounded theory. As part of their formal assessment, university students were given an assignment task which required them not only to gather data in the form of video clips and photos, but also to answer certain questions (i.e. fill knowledge gaps) that were posed by the events checklist (a mobile learning object). Qualitative data was collected through semi-structured interviews which were analysed using a narrative case-study technique. Two dominant themes emerged from the cases: affective issues and phone usage in a learner's formal and informal practice. Furthermore, the data suggest that in certain contexts learner sensitive scaffolding from the tutor (e.g. via text messages to students) could provide a key in terms of bridging the gap between formal and informal learning.

Some Thoughts about Informal Learning

The aim of the study reported in this paper was to investigate how mobile devices are being integrated by learners in their informal/private 'space' and what use they make of mobile devices in formal learning contexts. Specifically, we report on a study of the innovative use of high-end mobile phones for off-site and on-campus mobile learning. Very little rigorous work has been reported to date on the potential affordance that mobile devices can provide as a bridge between formal and informal learning situations (Cook, 2007; Vahey, Tatar & Roschelle, 2007). We are particularly interested in the bases of the appropriation (Bakardjieva, 2005) of new mobile communications systems. Bakardjieva (2005) characterises her approach to appropriation as "technology-in-use-in-social-situations" (p. 34), or technology extended to include the acts of use in social situations. This is where users mobilise available cultural tools, in our case smart phones, to respond to a social situation. Consequently, we expected to find early users of the Nokia N91 smart phones demonstrating agency, i.e. appropriation, in relation to discovering the relevance of mobile learning to their own contexts.

We take a broad definition of formal and informal learning and caution that our working definitions are intended only as work in progress. We view learning as a process of cognitive and social development (Vygotsky, 1978) in which social interaction is mediated by cultural tools, such as language and technology. Formality in learning we see related to external recognition and accreditation, typically in the

form of a qualification or an award and the infrastructure attendant to it, such as a curriculum or direct or indirect pedagogical intervention. Informality in learning is a complex field. Smith (1997, 2007) stresses that we should refer to informal 'education'; this is because 'informal learning' has been used of late as an en vogue term by various governments who have specific agendas and because the term education brings in a broader range of factors and social issues. He also points out that informal education "has been around as long as people have grouped together. One way of thinking about it is as the education of daily living". A similar view is put forward by Rogers (2006) who likens informal learning to breathing:

Informal learning is ... seen as a natural activity which continues at all times; it is highly individualised, contextualised ... . It is almost always concrete, limited to the immediate need; it is always embedded within some other activity. It is associated with our identities – either with confirming and fulfilling our identities in a changing world, or with changing our identities. It is our own individual way of making sense (meaning) of life's experiences and using that for dealing with new experiences. ... like breathing, it is the (mental) process of drawing into ourselves the natural and human environment in which we live ... and using it to build up (develop) ourselves. (p. 4)

A key defining aspect of informal learning for us is who determines the learning goals, i.e. agency. Thus we are viewing informal learning as a natural activity by a self-motivated learner 'under the radar' of a tutor, individually or in a group, intentionally or tacitly, in response to an immediate or recent situation or perceived need, or serendipitously with the learner mostly being (meta-cognitively) unaware of what is being learnt. In so doing, and guided by Eraut (2000), we want to focus our attention on the learning processes involved rather than on administrative matters surrounding them. Rogers (2006) distinguishes between 'task-conscious learning', "where learning is not conscious but takes place while engaged in some activity and when achievements are measured not in terms of learning but of task completion", and 'learning-conscious learning', "where learning is intended and conscious and achievements are measured in terms of learning" (p. 7). We find this distinction helpful and see informal learning towards the former end of the spectrum. Indeed, 'Bridging the gap?' in the title of our paper implies that informal learning can involve some links to formal learning. Thus we view formal and informal learning as being part of a continuum or a multi-dimensional clustering of informal and formal learning activities rather than positioned in an either-or relationship.

Research Methods

The methodology developed for our study draws on a range of different approaches to qualitative data analysis focusing in the main on subjective and perceptual aspects of students' personal and study-related experiences in using mobile phones. The methodology draws on narrative and case-based approaches underpinned by grounded theory (Strauss & Corbin, 1990). Narrative methodologies (Greenhalgh & Hurwitz, 1999; Greenhalgh, Russell & Swinglehurst, 2005) were used to analyse the data which comprised, in the main, of in-depth interviews with students supported by some content stored on their mobile phones. In this paper we only discuss the methodological dimension of the study briefly; for a full discussion see Pachler, Cook and Bradley (in press).

Strauss and Corbin (1990) suggest that grounded theory is especially useful for complex subjects or phenomena where little is yet known – as arguably is the case in mobile learning. This is because of the flexibility of the methodology which can cope with complex data and which is characterised by continual cross-referencing. This allows for grounding of theory in the data, thus uncovering previously unknown issues. We have found grounded techniques useful as a way of guiding our research, where concepts are classified and grouped together under higher order, more abstract formations called categories.

Furthermore, in order to gain the necessary insights into the processes governing mobile learning, particularly at the interface between the subjective and personal life worlds and experiences of the learners with the more formal requirements of university study, we decided to experiment with narrative approaches to research methodology in our study. Interviews were carried out with a representative sample of learners and the questions asked were loosely structured around key themes assumed to be of relevance in relation to the research questions. A first analysis of the data was based on the initial

themes and was followed by a meeting of the research team to discuss the viability of our original assumptions. The initial analysis revealed a number of broad categories in the data that can be seen to constitute variables impacting on existing mobile phone use and conceptualisations of potential uses. These were: user biographies; technical skills of users and functionality of devices as barriers or facilitators; 'techno-centricity' of users, and how this relates to conceptualisations of identity; attitudes towards learning; and user attitudes towards social networks. On the basis of this dialogue between the researchers, the qualitative data gathered through semi-structured interviews were used to construct cases; these are presented in full below and became the focus of more fine-grained analysis. As the discussion that follows shows, the two dominant themes which emerged are affective issues (e.g. do they think it is fun, etc) and phone usage in a learner's formal and informal practice (e.g. using the mobile phone regularly for work-based learning, etc).

We consider it important to differentiate between the use of narrative qualitative research methods for data *collection* and data *analysis*. We focus here on the latter. Narrative data collection methods are normally based on eliciting biographical data from subjects and involve minimal interviewer intervention. It also usually involves a number of follow-up interviews to explore responses in more depth (see e.g. Wengraf, 2001). Alternatively, there is naturalistic story gathering through ethnographic approaches. Narrative data analysis we understand as the composition, post hoc, of narrative cases characterised by rich and authentic description on the basis of the qualitative data available with interview transcripts, reflective diaries, blog entries, etc. The analysis in our study was characterised by an iterative inductive approach in which the 'story' is allowed to emerge through systematic analysis and categorisation of available data in discussion with other researchers to achieve a certain degree of 'inter-coder' reliability (see also Greenhalgh, 2006, pp. 78-81). This post hoc 'storying' allows for cases to be single or multi-authored, enables a dialogue between different researchers as well as a greater degree of reflexivity. Storying is a form of emplotment, i.e. " the literary juxtaposing of actions and events in an implicitly causal sequence " (Greenhalgh, Russell, & Swinglehurst, 2005, p. 443). Storying also allows for cases to be purposed and 'repurposed': they can be written and re-written to foreground and background specific issues and themes which emerged from the analysis:

'Storying' the case – that is, constructing a chronological emplotted account of the key actions and events – is a way of selecting which data to focus on and which to omit. It is also a way of drawing meaning from different data sources and making causal links between aspects of the case, either tentatively (as hypotheses to be tested in further research) or more firmly as lessons or conclusions (if the links are particularly strong and plausible). (Greenhalgh et al., 2005, p. 446)

Furthermore, we note that whilst problematising some of the challenges and inherent dangers of using narratives, Schostak (2006) has argued powerfully for the collection of anecdotes in order to enable the studying of the "dynamic, multi-dimensional and multi-layered narrative frameworks through which everyday and professional experience and action is organized" (p. 145). He sees anecdotes as providing the building blocks and structure for cases which, in his view, can offer "a powerful means of establishing the evidence base necessary to inform the development of theory, critique and thus inform judgement, decision making and the implementation of courses of action" (p. 145).

Throughout the analysis of the data, which took place with a view to composing narrative cases, the researchers were also mindful of the five overlapping stages of narrative analysis delineated by Muller (1999) and referred to by Greenhalgh et al. (2005, p. 444):

· entering the text (reading and preliminary coding to gain familiarity);

· interpreting (finding connections in the data through successive readings and reflection);

· verifying (searching the text and other sources for alternative explanations and confirmatory and disconfirming data);

· representing (writing up an account of what has been learned); and

· illustrating (selecting representative quotes).

Sample cases were constructed out of the interview data from the study, which we now describe.

Study Set-Up

University students taking a Masters module were given an assignment task as part of their formal assessment which required them to gather data in the form of video clips and photos from an off-campus event. Students worked in teams of between 2 and 4 people. Each student was loaned a Nokia N91 phone for a 7-week period to help with the assignment (Figure 1). They also had to answer certain questions (i.e. fill knowledge gaps) that were posed by the Event Visit Checklist, a mobile learning object installed on their phones (Figure 2).

Figure 1: Students trying out N91s in first session
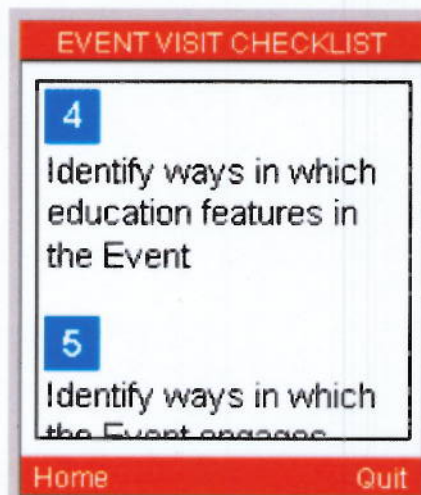
Figure 2: Screen shot of Events Visit Checklist

Lifeblog was preinstalled on the phones. We showed students how to activate it in the first session when we gave them the phones. Lifeblog captures all text messages, photos and videos in a single journal (see Figure 3 for screenshots from each student's Lifeblog). We have included these as they bring to life the user-generated content aspect of what the students were doing in the context of group activities; it is possible to obtain a flavour of what the students were doing in terms of text messages with team mates and photos from the events.

| Carolina's Lifeblog screenshot | Émilie's Lifeblog screenshot | Elli's Lifeblog screenshot |

Figure 3: Examples from students' Lifeblogs

The learning design intended to provide an appropriate mix between constructing learners' experiences of remote informal contexts and providing formal assessment of their activities. Furthermore, the opportunity for social construction of knowledge was provided through a shared uploading environment (mediaBoard), which the students could use to take decisions collectively about which content to use in their assessed presentation (see Figure 4 for a screenshot). Thus the learning design included an explicit formal judgment on learners' attainment of the intended learning outcomes (see Cook, Bradley, Lance, Smith, & Haynes, 2007, and Laurillard, 2007, for a detailed discussion). During the course of the assignment, the course tutor would use mediaBoard to text 'study tips' in the form of text messages to each team (see Figures 5 and 6 for some examples).

Figure 4: Screenshot from student use of mediaBoard

Figure 5: Tutor study tip 1

Figure 6: Tutor study tip 2

As the study progressed, a number of questions began to emerge, and became the focus of our research:

· What are the affective issues (is there a personal connection with the mobile device, do they think it is cool, fun, etc)?

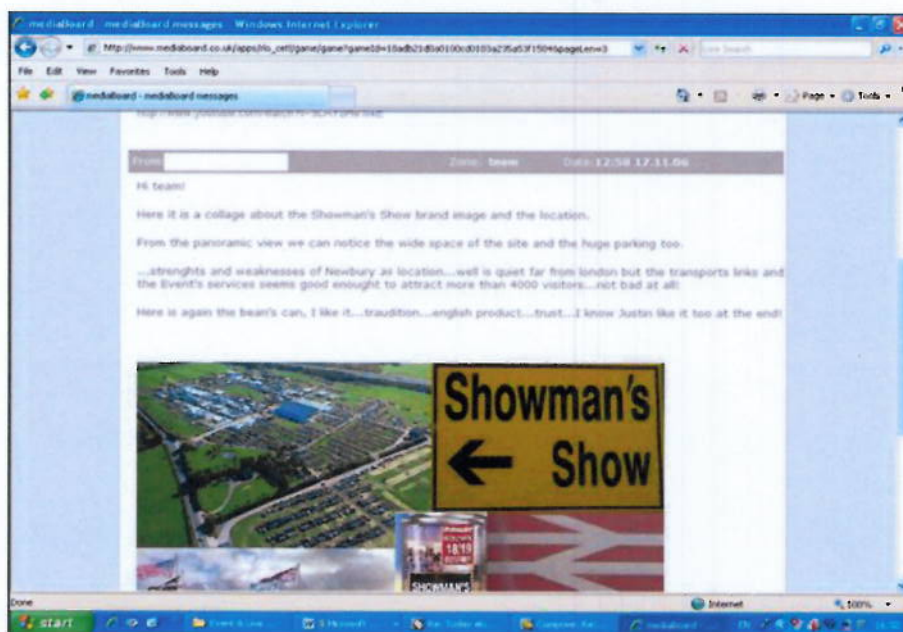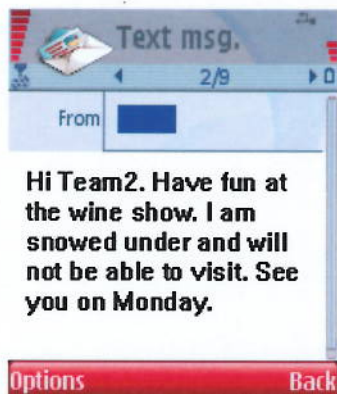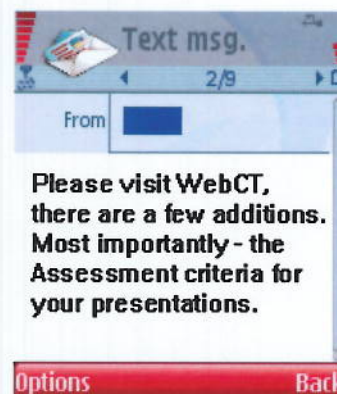· Could learners see themselves using this mobile learning technology regularly for personal, work-based and/or more formal educational use in the future?

· What are the learners' personal stories?

· Where does the learners' fascination with technology come from?

· How would the learners change the technology if they could?

· Was there an appropriation of the technological tools by motivated learners?

The focus of this paper is on the first two bullet points, i.e. affective issues and phone usage in a learner's formal and informal practice, although related factors will be discussed as necessary. We have taken this focus because, following the construction of the cases, it became clear that the data were particularly rich in this respect.

In order to answer these research questions, in-depth interviews with three course participants were conducted on the basis of purposive sampling, whereby students were selected because they made interesting comments in the group interviews we conducted at the end of the assignment (see Cook et al., 2007). In preparation for the interviews a set of interview questions was drafted, and agreed, around each of the research questions. These questions framed our interests and constituted a semi-structured approach to ensure that each student would, as far as possible, be asked the same questions and that all our research interests would be covered in each interview. Initial questions were focussed on putting the interviewee at ease and asking about their first uses of mobile phones to provide useful background contextual information.

The interviews were conducted on a one-to-one basis by one of the researchers, who was already known to the students from earlier evaluation activities during the study. The researcher was not part of the teaching or assessment team. Each interview was scheduled to last about an hour and was recorded and transcribed verbatim to preserve the precise language used by the students.

The interview transcripts were analysed qualitatively using an iterative, inductive approach to the data, whereby themes were allowed to emerge through systematic reading by three coders, the authors of this

paper. The themes were then used to categorise the data (see below for the preliminary categories). Throughout the analysis of the data, which took place with a view to composing narrative cases, the researchers were also mindful of the five overlapping stages of narrative analysis outlined above (from Greenhalgh et al., 2005).

The three students featured in the cases are not necessarily representative of the large mobile phone user base; rather, they represent a small sample of female international students in their mid twenties who, whilst not early adopters, have all been part of the early significant wave of mobile phone users. All three participants are well educated, belong to a particular socio-economic stratum, and provide a fascinating tapestry of attitudes to and practices of mobile phone use. Whilst we make no claims here that our (necessarily brief) analysis of the rich data is generalisable more widely, an initial analysis by the three authors suggested that there were a number of broad categories emerging from the data that constitute variables that impact existing mobile phone use and conceptualisations of potential uses, namely:

· user biographies;

· technical skills of users and functionality of devices as barriers or facilitators;

· 'techno-centricity' of users, and how this relates to conceptualisations of identity;

· attitudes towards learning; and

· user attitudes towards social networks.

The above preliminary categories were used to help us construct the three narrative cases presented below.

The Case Studies

The three narrative case studies are reproduced here. Pseudonyms are used instead of real names and informed consent was sought and obtained from participants.

Émilie's case   (audio)

Émilie is a 23 year old international student from Belgium who moved to England in order to do her Masters degree. She considers her IT experience and mobile phone ability to be adequate.

Émilie has owned a mobile phone from the age of 18, the first being a hand-me-down from her sister, who was given it by her boyfriend. It was a promotional phone which she wanted to change to a "cooler" model, despite being very happy with the phone, in order to get rid of the logo of a multinational soft drink company that adorned it visibly.

Émilie places importance on the device being affordable, easy to handle – "I just want to click on the one button" – "cool" and "nice", without explaining in detail how these adjectives are best defined. Other characteristics she values in a mobile phone are "flatness" and battery life. For Émilie ease of use is the main criterion that influences her purchase decisions. She professes to problems with working advanced features of mobile phones – "I have difficulties learning new technologies" – and she, consequently, doesn't place much importance on them, although she admits to have been tempted into buying her current phone on the lure of it coming with Bluetooth, even if she doesn't (know how to) use it. Functionality, she says, "is nice to have", but she doesn't "have the urge" to actively use the features.

Émilie's main uses of her mobile phone are phoning and texting – an assertion that the quantitative user

data from her project phone corroborates [taken from phone usage data not provided in this paper]. She describes herself as being "quite old-fashioned" in relation to technology and asserts that she "just wants to keep in contact with some people". She also describes herself as a "lagger". "I will first see and hear from other people how new technology is". By way of an example she mentions her adoption of an iPod which she had as a present from her partner and which, she says, she would never have bought for herself as it is too expensive and because she doesn't "really need it". Interestingly, once Émilie had worked out how to use the project phone as an MP3 player, she would do so with delight: "But once I got the hang of it ..., it was really painful to give it back ..." Also, she can see herself using a PDA once she has matured from being a student into employment and might need it. She watches fellow train passengers using their PDAs with interest.

Émilie views manuals as a barrier to learning about the functionality of mobile phones: "... when I buy a new phone, I'm really enthusiastic about it. I want to know everything so I start reading the manual and after the first page I'm already like, I don't want to read this anymore". Her description of how she best learns about using the functions of her project phone foregrounds learning by doing and the social dimension of the learning process in that she mentions the sharing of knowledge in a group as being conducive: "... within the group, I said to a friend, tell me now, step by step, how I have to upload that software and stuff like that...". "But we didn't really sit down and discuss how you could use the phone. It's like more when you're doing stuff. It's like, how do you do this? Do you know that? Yes. And you learn much quicker in that way than reading it from a book or a manual. In that way we shared some knowledge."

Émilie views mobile phones as essential for herself in particular and adults more generally to keep in contact with friends and family and for making practical, every-day arrangements such as being picked up by her partner from the station – "I can't live without it" – but not necessarily for children and teenagers: "I see sometimes young children of 7 years old already have a mobile, then I ask myself the question why they have that."

The social networking dimension provides a clear motivation for Émilie: "You need it for group work because if you can contact each other because you never know when people are going to ... check their emails so it's always nicer to give them a text or a call." "And then, yes, it's just to keep in contact with each other because we only see each other 8 hours a week with student colleagues so we have to keep in touch with each other, mainly to do group work."

Émilie sees herself as immune to peer pressure and not as a fashion victim: "I'm not going to buy things because the other ones have it". However, later in the interview, she does admit that "it's nice to show off."

When asked about using her own mobile for learning purposes, Émilie is quite categorical: "I don't really see the point in using a mobile for learning purposes"; "... you could use your mobile for learning purposes is just to keep in contact with your group and that's it." "Ok, you can take pictures with your own phone but I don't really see it, having a mobile added to your learning purposes because you already have the internet, you already have the learning platforms specially designed for group work. It's going to be too much media and people are going to get confused ..."; "... it was just so confusing. You had to check that platform every day. You had to check your e-mail every day. Then, oh, yes, your phone is ringing with that information." "The only thing I thought was good for learning purposes is when you send a message on our phone to say, like, class is changed, or check your email. That was nice. I really liked that"; "I can't see us doing that with a mobile, taking notes." She didn't use the learning content on the mobile phone, but thinks "there is potential in it."

Émilie has a good concept of what informal learning might be but she is not prepared to see mobile phones as making a contribution to it: "No. School side no, I don't use my mobile. If I want to learn something personally, informally, no, I don't use it. I just use it for basic things and that's it. It's not like, if I walk in a forest or something and I spot a nice tree, I'm going to take a picture of it and take it with me back home and look it up on the internet and see what it is. If that's what you mean by informal learning, I'm not going to do that." Curiously, this is not because she can't conceptualise the role of mobile phones,

but "Because I'm not interested in it [informal learning]. Maybe if I found things that interest me, maybe I would do it then. What interests me? That's a hard one. Maybe if you have a particular interest in, I don't know, motor shows or something, and you want to learn about it, then maybe why not take pictures. But then again if I went to a motor show I would take my digital camera with me which is more convenient. So, no, personally I wouldn't use my mobile for learning." "... it wasn't like the mobile had a direct influence on our motivation to do the assignment. I mean, the assignment apart from the mobile was already nice."

Carolina's case   (audio)

Carolina is 24 and is from Venezuela. She has been in London for 4 years and had her first mobile at the age of 15. She rates herself as having "good" mobile phone ability. Her brother had a mobile, and then her mother got her one so that she knew where she was.

In a mobile, functionality is important for Carolina, it should be easy to use, small, and light enough to be carried around, and fashionable. She says of her current phone: "I like it. It's easy. It's trendy. It's light, I mean it's not heavy, it's easy to carry and it's small. It's got everything I'm looking for in a mobile." She mainly uses her mobile for "Texting and calls, and for Bluetooth as well." She uses Bluetooth for "Sharing music between friends, or pictures."

Carolina sees her mobile as being indispensable: "I can't leave [home] without my mobile." She says "It's like a friend. It's my best friend." She is "Just happy to have it close to me." The main reason for this seems to be because "It keeps me connected with people. That's what I like, because I'm quite a social person ..." She likes to know what her friends are doing all the time and how they are, and sees her mobile as a method to keep connected with friends, to build friendships and for socialising. "It's about talking to people and being connected and linked to them all the time." She goes on to say that "I even sleep with my mobile underneath my pillow just in case somebody texts me," commenting that "It's sick, I know." Part of the reason for this habit is that her friends who go to bed late or are in Venezuela often call or text at 4 or 5 o'clock in the morning. Her social networks and the use of mobile phones to maintain them are very important to her. For the duration of the assignment she said that she was carrying both phones around with her. She continued to use her own mobile, as all her friends and everybody else knew her number – she needed to maintain her existing networks with friends and family.

Carolina sees new technologies as being "basics" of everyday life, and carries her mobile, laptop, and CD player with her every day. She also likes to keep up-to-date with new technologies: "I keep changing my mobile phones, for instance. If I see a new one I would like to have it." The desire to have "new" things seems to be her driving motivation in this respect. "If I could afford all the technology that comes out every single month I would have new things all the time." She expressed an interest particularly towards phones and devices to play music. She has a fascination with new technologies, summed up by the phrases, "I'm a bit kind of biased that every single new thing that comes out I would like to try it.", and "I would like to know more about them, to see what they offer." She acknowledges that it's symptomatic of her age group, and that in London she is influenced by the rapid changes in new technologies and the constant advertising around her of these products.

Whilst she is keen to have the latest technology, she is also reluctant to invest a lot of time in learning how to use and maximise the functionality of the phone she has. For example she would like to learn how to use MP3 on it so she wouldn't need to have her iPod with her as well, but she hasn't read the manual to find out how to use it. When asked why, she replied "I don't know, I think I'm lazy."

Carolina thought that the Nokia N91 phone that we lent her was too big and too heavy. Whilst she liked the many features it had, she found it more complicated to use and had problems with the menu system and the buttons and how to use them. However, she did read the manual to help her use it, even for what she called "easy stuff". She particularly liked the panel for accessing music on the front, the Lifeblog facility, and the fact that it was easier to connect to the internet than her own phone (these functionalities

were mentioned several times throughout the interview). She summarised her view of the N91 as "it's like a little computer so it's excellent for me. It's just the handset, it wasn't comfortable for me, but all the features they were just great."

Carolina used the loaned phone predominantly for the assignment: for contacting classmates and the tutor, and for taking photos to upload to mediaBoard. One of the advantages for her was that it made it easier to keep in touch with her team mates, especially on days when they couldn't meet. In addition, because they weren't paying for the cost, they could talk for longer than they might normally about the assignment or what they were doing. Another advantage was that her team had a mentor who worked for the event organisers, who had the same Nokia phone and free minutes, and contacted them directly to their mobiles, and sent them videos and materials about the event or anything that she thought would be useful. Whilst the loaned phone clearly had a number of advantages, she did say about her use of it: "It was mainly because we had to use it, we had to use it, it played an important part in our evaluation [assessment]", but she did acknowledge that "it makes it easier to study." She found the Events Checklist learning object that was preinstalled on the phone "really useful" when they visited the event, because it was there all the time. "Because of those guidelines we knew what to look for, or what to ask, or what to take pictures of, or which people to interview ... It made it easier for us to get the information out of it." Her appropriation of the phone was thus mainly to use it for the assignment. "The Nokia was only for university purposes, only to contact my friends from here, or xx [the tutor], or to use the mediaBoard and the guidelines on the phone [the events checklist], and the other one was more about socialising and for my normal life, like working, family, and friends out of university."

When asked about owning a high-end phone in the future and how she would feel about using her own mobile for learning purposes, Carolina had no problem with the concept, and could see many ways in which she would use it. She felt that, because it would be her own phone, she would already know how to use it, unlike the situation with the loaned phone. She could see herself recording videos of her lectures, taking pictures of situations she encounters that could be used for assignments or coursework, or interviewing people there and then. She could also use the internet to help research things and download materials, and could then Bluetooth these to her colleagues: "I could share them with my colleagues for instance and let them know what I have found ... and I could tell them straight away." Later on when she was asked about the use of learning materials on phones, she said that short video case studies would be useful, e.g. about a company she needed to know about for her coursework. "I think videos would be really, really good, really useful. And they're easier to understand and they inspire me, the images, and the sounds, makes it clearer, you have a vision of what the company or the event is like." She views the mobile phone as an ideal tool to facilitate the types of learning activities she envisages. "I don't have to carry things, other things, bigger things with me, because the mobile has it all. So it's easy to take pictures, to record voices, to take videos and all that together will make me collect all the information I need and then work on it when I'm at home. It's just easier to have a mobile." In response to a question about any barriers that might stop her from using her phone for learning, she said "No. Only if it gets damaged or gets wet or something, but otherwise no. If I can make calls, it's fine."

When asked if she currently uses her mobile to help with learning, either formal or informal, Carolina expressed her appropriation as being based around making calls. "I think it's basically making calls. Making calls, because in that way, how can I say this, I can call people, and if I need some information or something that they could help me with, or if I'm really interested in getting some tickets to go to an event or something I'm interested in or to an exhibition, I just get the phone number, and I just contact that person, and I could talk to them." She didn't see any distinction in the way that she would use her phone for formal education or more informal learning tasks "I would use it all the time anyway. It's just about information." She is expressing a view of learning as a need to get information, which can be satisfied by contacting people to get the answers. Whilst she didn't mention any specific examples of informal learning in her response to this question, she did cite other examples in other parts of the interview, such as that she'd like to learn how to use MP3 on her phone, and would like to know more about new mobile technologies to see what they have to offer. Similarly, she didn't mention any other examples of using her mobile for formal learning here, despite mentioning them elsewhere, and providing rich examples of how she could see herself using it in the future.

The benefits afforded by the mobile phone are mentioned several times throughout the interview, and are summed up by the phrase "it's easy, it's handy, and it's now, I can use it now." Carolina uses her mobile to call her mum whenever she wants to speak to her, because she can do it there and then, even though she knows there are cheaper alternatives, e.g. Skype, going to an internet café, or waiting until she gets home. Immediacy is important to her, as mentioned earlier when she said she could see her using her mobile to capture materials for assignments as she encounters them (taking photos, recording interviews etc.). She goes on to say "I mean you can do everything without having to be seated or be in a proper place, you can just stay where you are and do your stuff, your own things. And it's very personal as well. You don't have the risk of other people looking at what you're doing or what you're saying or what you're writing." The "personal" aspect of the mobile phone is also important to her.

Carolina does have some concerns about mobile phones blurring the boundaries between study, work, and personal time (she works as well as going to university). She says, "sometimes I receive calls from work when I'm studying and I just, I don't like it, I don't know, it's my own time, and I'm the one who decides when to stop." She goes on to say, "But it's about me, it's not about the technology I would say, it's about individuals basically, but it does break that pattern." She does like to separate out her time into studying, work, and leisure time, and said that she gets "stressed" if someone contacts her about university issues whilst she's at work.

Elli's case (audio)

Elli is a 24-year-old international student from Greece. She is proud of her home country but admits that "we're not so much technology-orientated but we're hanging in there." She has been in England for 5 years, having studied for a BA for 4 years and now doing a Masters. She considers her IT experience and mobile phone ability to be good. Elli has owned a mobile phone from the age of 16 and places importance on the device being fascinating; indeed when she got started with mobile phones, she "loved" the ability to text.

She first bought a mobile phone because she used to work at night, and the mobile phone acted as a form of security for her (because she had to walk home late at night). During the interview it became clear that the phone still provided a link to safety: "In an emergency, I feel quite safe. For example if I walk at night, my friend who's got free minutes will call me and she says "where are you?" And she walks with me." A preference for mobile over fixed phones seemed to emerge when she reports that "I've been in the UK for 5 years, I've never had a landline." When asked the question 'Why do you think you have a high level of interest in new and mobile technologies?', she replies that she sees technology as part of her strategy for self "evolution" and "survival" and that "the less you know about it [mobile technology] the less chance to you have to survive in your job". However, a perceived drawback of technology is that it takes you away from communicating with the five senses; Elli sees face-to-face communication as essential.

Affective factors loomed large in Elli's relationship with the technology. Words like "exciting", "trendy", "loved it" (this appeared repeatedly), "stylish", "curiosity", "anger", "cool", "disappointment", "thrilled", and "addictive" were some of the words used to describe her relationship with mobile phones in general; although she did not provide detail about how some of these adjectives should be defined. Elli has a fascination with technology; she even asserts that she "couldn't live with out one [i.e. her mobile phone]."

Throughout the interview Elli displayed a balanced perspective with regard to the technical functionality of mobile phones, having a preference for the following key features: music, pictures, video, style, easy menus, durability, and "better services". The notion of a service cropped up again later when she was asked "Do you think because you had to give it back it affected the investment you had to make in learning how to use it in any way?" Elli replied: "I'm not the kind of person ... Even though I use mobile phones every day, I'm attached to the service it provides me, not to the machine itself." Indeed, Elli prefers the mobile phone not to be too big and heavy or "over-featured". She was aware of health and safety debates but was clear throughout the interview that there was a need for her to stay in control of

the technology, for example: "I will definitely go for new technologies but always with a certain, how do you say it, to use it but not overuse it, not to become dependent. For example, I try in my mobile phone not to store all the phone numbers because, I realise that for me I become more lazy. I try always to remember and exercise my brain even though most of the time I don't get it. That's why I have 400 reminders! But I'm trying hard."

Elli places importance on a device that is easy to use, "Nokia phones have such an easy menu, so straightforward. Now I have like a Motorola, which stinks." Elli does not like all the features of her phone; with respect to games she says "I hate them, I never use them." However, her preference is that "I use pictures; pictures and videos, especially with my friends you know, for jokes and stuff." Elli also likes the fact that "you can personalise them [mobile phones]" by changing the colour of the case etc and compares her previous phone that broke to a boyfriend who has ended the relationship: "We had a good relationship, now he dumped me, he died on me (ha ha ha)," and later described her relationship with her current phone as follows: "My mobile phone has replaced my boyfriend (ha ha ha). We are very close." After the price of a phone, the next important criterion for choosing a mobile phone is a match to her personality: "I look at the things that mostly match who I am."

Elli was conscious of being loaned an "expensive" phone and yet thought it was helpful for the task: "We took so many pictures and the analysis of the pictures was great, the video was great, and it was a very cool experience. Nice phone, and easy to use." The fact that the phones were only loaned for the duration of the assignment was seen as an opportunity by Elli: "And I think another thing that stimulated me to use it fully is because I knew I had to give it back. I had to make an experience of this and I had to know everything about it, because it's a chance to get to know more. It's the latest technology, a new phone, so it's a chance."

Elli was "thrilled" to use the N91 on the assignment but also found it a "challenge" and a responsibility due to the expense of the phone and because of a desire to be "respectful" to the university, who had lent her the phone. The phones were seen to be useful for the task involved in the study; for example, Elli's answer to the question "So what do you think about having learning content on mobile phones?" was "It's nice. Always depending on what the learning tasks are. If it's something like the one we did, where went to the event, it's packed with people, you are already holding all the brochures and all the junk they give you so you have the mobile phone. You have the guidelines, you don't need to bring more paperwork with you. You don't need books you have it there, it's just a click away ... [and a bit later] We just went home and we had the mobile phone with the notes and the books, and we said OK; point 4.5 let's say. Then we used to go through the books, write, [send] it around ..."

Receiving text messages from the tutor was seen as a positive aspect of mobile learning: "I mean we had text messages from our teachers, how cool is that! You're having [teacher's name] texting you, I really loved it." These texts could even, in the future, serve the function of letting students know that "you are not alone." Indeed, the phones were seen as enabling group communication, which in itself enabled her and her team mates to get over key hurdles when it came to motivating themselves to work on the assignment task. However, this perspective was counterbalanced by the view that technology can cut us off, and that there is a consequent requirement "not (to) overuse it" and remember the value of face-to-face contact.

Elli learns a lot about technology from her friends as she feels able to ask them what may seem like silly questions. Also, throughout the interview Elli illustrates that she engages in informal learning, although she may not call it that, for example: "... I remember like the first days I used to have a mobile I used to sit on the sofa for hours, looking, and trying out stuff, you know, and going through how it works, what it does ... It's the curiosity and not only the excitement of the new. And if it's stylish as well, you have to know everything about it." Indeed, Elli uses her mobile phone to obtain information about theatre and musical events that she is interested in. Furthermore, Elli is quite adamant that the formal and informal learning aspects should never meet: "But again I think that, if formal and informal would ever meet, it wouldn't work ... Any informal learning – it's all about you. My pleasures, what I want to do. Whereas the formal learning is something that I have to, I have to [do]. It's something that is important and crucial for me to learn. So you start from another perspective completely." On a related note, Elli describes how on her first

degree she had a chance to gather attitudes of users of the Blackberry device. What became clear when relating this story was that she is conscious of the potential for mobile technology to have an undesirable impact; indeed this issue raised itself on several occasions in the interview. Elli describes the users of Blackberry's as being "miserable" and that "everybody was saying that from the day I got it I have had no privacy, I have no time, I can get my emails wherever I go! And this is so bad. So it put me off a little bit." However, Elli was clear that one has to use this technology wisely, that it affords fast access to the internet, and that in the future she may have to use these devices for work. Elli equates the portable computer with work-related activities, and suggests that having to take one's work everywhere "would be a disaster. You wouldn't have any personal time" and that a consequence of this may be to "lose the contact with your life."

Elli tends to mention her boyfriend, sister, mother, and friends in the context of her mobile phone usage. Early in the interview Elli relates the story that her sister sat on, and damaged, her first mobile phone and relates a sense of loss, suggesting that she doesn't like her newer phones as much as the first and concludes: "I don't know, emotionally attached [laughs]." Later, she relates the story of how she taught her mother, who was 65 at the time, to text because "it has become a part of our daily lives, whether we like or not." When asked the question: "Are there any other features or technologies that you would like to combine with a mobile phone?" Elli is able to envisage useful future uses of mobile phones, and makes suggestions of functions that could help her mother, who is visually impaired; for example such features as an announcement of who is calling, or voice read-outs of text messages.

Discussion

Qualitative data were collected through semi-structured interviews and analysed using a narrative case-study technique. In the three cases presented above, two dominant themes emerge: *affective issues* (which include attitudes towards the functionality of the device) and *phone usage in a learner's formal and informal practice* (which includes aspects related to social networks). These two themes are interlinked and there are, therefore, occasions when the division adopted below to structure our discussion of the data for reasons of presentational clarity works less well.

What follows is an exploration of the two themes. Whilst the above cases each tell a story in their own right, the two emerging themes do point to more generalisable findings. We are, of course, aware of the limited number of cases presented here and are not making any broader claims for the two emergent themes other than to note that they deserve further investigation. However, narrative analysis can make potentially strong links inter-textually as well as intra-textually, and that appears to be an outcome of our research.

Affective Issues

Émilie is not afraid to admit that she has difficulties in learning about technology and her case clearly evidences that she also has perceptual barriers about informal learning with mobile devices. Indeed, Émilie's fraught relationship with advanced technical functionality of her various mobile phones, coupled with her inability to use manuals to acquire new skill sets seem to conspire against her ability, and willingness, to make use of the mobile phone in the context of informal learning. In contrast with Émilie, Carolina's relationship with mobile technologies appears to be motivated more by functionality and how they can support her everyday requirements. For Carolina, her mobile is indispensable; she can't leave home without it, because "It keeps me connected to people." Elli is at the opposite end of the scale to Émilie in terms of her affective relationship with technology. Some of Elli's comments echo Carolina's comments above regarding her affective relationship with technology when she asserts that I "couldn't live without one [i.e. her mobile phone]." But Elli takes her technology relationship one step further than Carolina, using a "boyfriend" metaphor to describe her connection with her phone. This emphasises the apparently strong relationship that Elli has with her mobile phone. These issues of identity, affect and technology require further investigation.

Phone Usage in a Learner's Formal and Informal Practice.

Elli has a very different perspective than Émilie regarding the use of mobile phones in learning. In the main, Émilie sees the potential of mobile phones for learning only in relation to administrative tasks and social networking around learning: to keep in touch with fellow students and to facilitate group work. Elli, on the other hand, can see a real use for mobile devices in informal learning. However Elli is quite adamant that the formal and informal learning aspects should never meet; but this seems to contradict the statement that she loved getting the texts from the tutor. Furthermore, Elli appears to equate informal learning with pleasure and formal learning as something "I have to" do. It is possible that Elli is prepared to blur the distinction between learning and "me time" (her own personal activities) but is not prepared to let work into her private mobile space. She supported this position in the interview with the Blackberry story, suggesting that with such a device, there is no going home when you have finished your work; you have to take your work home with you. Émilie, however, is quite categorical: "I don't really see the point in using a mobile for learning purposes." However, there is agreement between Émilie and Elli that the targeted learning hints from the tutor (see Figures 5 and 6 for examples) were useful; these could provide a key to how we bridge the gap between formal and informal learning, an issue that is implicit in the title of this paper. Émilie states that "The only thing I thought was good for learning purposes is when you send a message on our phone to say, like, class is changed, or check your email. That was nice." (audio clip) Elli is positive: "I mean we had text messages from our teachers, how cool is that! You're having [teacher's name] texting you, I really loved it." (audio clip)

As with affective factors, Carolina is closest to Elli in terms of her views on the mobile device as an integral part of her life; she has no problem with the concept of using it for learning purposes, and can see no barriers to using it. It is worth noting that cost was not mentioned by Carolina as being an issue in her case. Interestingly, Carolina was able to envisage a number of uses for her mobile to support formal learning situations in the future, for example taking videos of lectures, generating content for assignments or coursework (photos, recording interviews), using the internet for research and downloading materials, or sharing found content with team mates via Bluetooth. She expressed a view of formal and informal learning that was centred on seeking information. She sees communication, which can be facilitated by the mobile phone in the form of calling and texting, as a way of facilitating the teamwork process. As in other aspects of her life, if she has an immediate need that can be fulfilled by using her mobile, then she'll use it. This is another example of how mobile phones can bridge the gap between informal and formal learning.

Conclusions

This paper has reported on a study of the use of high-end mobile phones for off-site and on-campus mobile learning. Qualitative data was collected through semi-structured interviews which was analysed using a narrative case-study technique, supported by grounded theory techniques. Two dominant themes emerged from our cases: affective issues and phone usage in a learner's formal and informal practice. This study suggests that the 'gap' between formal and informal learning, and how to bridge it with the help of mobile devices, is an important issue. However, we readily note the limited number of cases and are not allowing ourselves to make any broader claims for the two emergent themes other than to suggest that they deserve further investigation.

In accordance with grounded theory, we are building up our perspectives from the bottom up. Consequently, we have not engaged in any theorising of a traditional kind. Instead, we presented three cases that tell powerful stories and we explored the factors and issues that pervade the emerging themes. The findings of this study only allow for some tentative suggestions in relation to how the bridging of the gap between formal and informal learning might be achieved. One possible way of addressing the problem is targeted learning hints from the tutor (Figures 5 and 6). This finding has implications for context-aware mobile learning systems (see e.g. Beale & Lonsdale, 2004) and, in particular, for the ongoing issue of maintaining a balance between effective support and intrusion . Detecting the instance when a learner needs appropriate scaffolding in the form of a learning hint will provide us with what we hope will be a productive avenue of further work. For example, once the students in our study had visited

the live event, the tutor sent them a text message pointing out where the assessment criteria for a forthcoming presentation had been placed in the university's Virtual Learning Environment (Figure 4). For more advanced systems, we can envisage a scenario where a mobile phone that is aware of the learner's imminent assignment gives the learner a reminder of the whereabouts of relevant resources like assessment criteria and the location of the room for the presentation. Such a system could even offer to put the learner in contact with other members of their group so that they could collaborate on the development of the presentation. Future work will explore the possibilities of providing such context-aware, timely learning support .

Our study also shows that there exists a considerable need for conceptual work clarifying definitional bases of informal learning in the context of learning with mobile devices, as well as around the interface between formal and informal learning and how existing gaps between them can best be bridged. Both formal and informal learning are governed by certain structures and processes, for example around knowledge generation and transmission, as well as certain 'cultural scripts'. There is a need for identifying characteristics of 'cultures-of-use' in particular around the role of technology in learning processes in both fields as a precursor to trying to create synergies between them. It strikes us that, at least in part, the lack of ability on the part of the learners in this study to conceptualise effective uses of their mobile phones for learning relates to the need for a change in mindset in learners in terms of their preconceived ideas about what valuable learning is and how it can be engendered.

Acknowledgements

References

Bakardjieva, M. (2005). *Internet society. The Internet in everyday life*. London: Sage Publications.

Beale, R., & Lonsdale, P. (2004, September). *Mobile context aware systems: The intelligence to support tasks and effectively utilise resources*. Paper presented at the MobileHCI, Glasgow, UK.

Cook, J. (2007). *Generating new learning contexts: Novel forms of reuse and learning on the move*. Invited talk at ED-MEDIA 2007 – World Conference on Educational Multimedia, Hypermedia & Telecommunications, June 25-29, Vancouver, Canada.

Cook, J., Bradley, C., Lance, J., Smith, C., & Haynes, R. (2007). Generating learning contexts with mobile devices. In N. Pachler (Ed.), *Mobile learning: towards a research agenda. WLE Centre Occasional Papers in Work-Based Learning 1*. (pp. 55-74). London: Institute of Education. Available at: http://www.wlecentre.ac.uk/cms/files/occasionalpapers/mobilelearning_pachler2007.pdf

Eraut, M. (2000). Non-formal learning, implicit learning and tacit knowledge in professional work. In F. Coffield (Ed.) *The necessity of informal learning* (pp. 12-31). Bristol: The Policy Press.

Greenhalgh, T. (2006). What seems to be the trouble? Stories in illness and healthcare. Oxford: Radcliff Publishing.

Greenhalgh, T., & Hurwitz, B. (1999). Narrative based medicine: why study narrative? *BMJ, 318*, 48-50.

Greenhalgh, T., Russell, J., & Swinglehurst, D. (2005). Narrative methods in quality improvement research. *Quality & Safety in Health Care, 14*, 443-449.

Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed), *Mobile learning: towards a research agenda. WLE Centre Occasional Papers in Work-based Learning 1* (pp. 153-175). London: Institute of Education.

Muller, J. (1999). Narrative approaches to qualitative research in primary care. In B. F. Crabtree and W. L. Miller (Eds.), *Doing qualitative research* (pp. 221-238) (2nd ed.). London: Sage Publications.

Pachler, N., Cook, J., & Bradley, C. (in press). Whither case-based approaches to understanding off-site and on-campus mobile learning? In G. Vavoula, N. Pachler & A. Kukulska-Hulme (Eds.), *Research methods in mobile and informal learning.* Berlin: Peter Lang Publishing Group.

Rogers, A. (2006, September 21-23*). Informal learning in lifelong learning.* Paper presented at Informal Learning and Digital Media: Constructions, Contexts and Consequences. University of Southern Denmark, Odense. Danish Research Centre on Education and Advanced Media Materials (Dream). Retrieved February 12, 2008 from: http://www.dream.sdu.dk/uploads/files/Alan%20Rogers.pdf

Schostak, J. (2006). *Interviewing and representation in qualitative research.* Buckingham: Open University Press.

Smith, M. (1997, 2007). *A brief history of thinking about informal education.* Infed. Retrieved February 12, 2008, from http://www.infed.org/thinkers/et-hist.htm

Strauss, A., & Corbin, J. (1990). *Basics of qualitative research: grounded theory. Procedures and techniques.* Sage: London.

Vahey, P., Tatar, D., & Roschelle, J. (2007). Using handheld technology to move between private and public interactions in the classroom. In M. van 't Hooft & K. Swan (Eds.), *Ubiquitous computing in education: Invisible technology, visible impact* (pp. 187-210). Mahway, NJ: Lawrence Erlbaum Associates.

Vygotsky, L.S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Wengraf, T. (2001). *Qualitative research interviewing: Biographic narratives and semi-structured methods.* London: Sage.