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ARTICLE

What's Happening in 'Their Space'? Exploring the Borders of Formal and Informal Learning with Undergraduate Students of Education in the Age of Mobile Technologies

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The changing nature of teaching and learning in an age of accessible technologies provides challenges and opportunities for the design of learning events. Working with a sample of undergraduate students of education in one UK higher education institution we use an exploratory, qualitative approach to investigate students' spontaneous uses of their mobile devices in their learning. We argue that students' preferences and practices need to be jointly considered in the design of learning if it is to be effective.

Keywords: Mobile learning; spontaneous; higher education

Background to the study

Universities as spaces for learning have experienced a technological transformation both in real and virtual terms and this has created a new digital landscape that students and university lecturers inhabit. The nature of this new landscape continues to be documented in specific disciplines such as engineering and social work (e.g. Margaryan, Littlejohn and Vojt, 2011); in environmental sciences (Gordon, Jackson and Usher, 2014) and in specific educational contexts such as in Singapore (e.g. Menkhoff and Bengtsson, 2012). Other studies have looked at the uses of technologies by specific age groups. The work of Green and Hannon (2007) in the UK explored children and young people's (aged 4-16) engagement with new technologies and coined the term 'their space'. This term was used an indicator that, at that time, young people's uses of technologies were not well understood by the adults in their lives and thus the young people were making their own digital worlds. Taking this perspective on board, we felt that the arrival of this generation of young people at university merited further exploration through research. Green and Hannon (2007) documented the rich range of uses of technologies which young people participated in from socialising to information gathering, but they noted that not all young people had the same level of interest in, facility, or engagement with technologies. Bennett and Maton (2010) made a timely call for a more nuanced understanding of the extent to which 'digital native' can be applied to any particular group. As such, we embarked on the study reported in this paper to investigate how two groups of undergraduate students of Education in the UK engaged with their own mobile devices in spontaneous ways during university studies. The rationale for using Education students as a focus was that, as future educators, in either schools or other contexts, these students may have an engagement with mobile technologies reflecting not only their personal (learning) preferences but also their future professional roles as educators.

To explore undergraduate students' uses of mobile technologies in their learning we conducted a qualitative study which was designed with attention to the metaphor of 'mapping' learning (see Martin and Kamberelis, 2013). The mapping metaphor contrasts with what may be, arguably, a more common metaphor of tracing, that is, as looking for traces linking learning behaviour and preferences to particular factors such as age or ownership of particular devices. We sought to understand how and whether students would make spontaneous use of their mobile devices in seminar contexts and in tasks set outside of seminar time. In doing so we acknowledged the importance of students' perspectives on their learning and study preferences following influential work on 'student voice' by educational researchers such as Fielding (2001), Fielding and Prieto, (2002) and Flutter and Rudduck (2004). Thus, we used a range of research methods in an exploratory way to develop an understanding of a sample of undergraduate Education students' practices and preferences in using mobile technologies in their learning.

This paper now proceeds with a selective literature review of studies which have informed our thinking, an outline of our research focus, methodological approach and methods used, an analysis of the data, discussion of

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emergent themes, implications and recommendations for future research and practice.

Learning with mobile technologies – A selective literature review

Research into the use of personal mobile devices for learning has grown significantly in the last ten years, as has the number of published studies reporting findings. A selection of studies informing our thinking for this paper is discussed below.

A focus on mobile learning raises questions as to the nature of the learning taking place: is it learning with new tools or a different kind of learning? A continuum of learning is outlined by Cook, Pachler and Bradley (2008) which proved a valuable, informing concept in our study. These authors suggest that students see their mobile use as sitting on a continuum from informal to formal which is characterised by a 'multi-dimensional clustering' of practices (p.3). The authors call for more research into the 'characteristics of 'cultures-of-use'' (Ibid., p.17 original emphasis) of learning with mobiles and as such our work seeks to contribute to this challenge.

Some researchers (e.g. Sølvberg and Rismark, 2012) use the concept of space as a means of developing the defining feature of learning using mobile technology. If learning technologies and learners are mobile then where is the learning situated? It is within a 'digital-physical' landscape that universities are attempting to support students' digital experiences on and off campus, while travelling between these locations and elsewhere, by creating environments conducive to supporting 'seamless learning' where learners can consume, create and collaborate across and between these different contexts (Chan et al., 2006). Seamless learning can be applied to non-digital experiences, for example, transferring learning from a face-to-face tutorial to writing a critical reflection later on at home. In a technological context, Mobile Seamless Learning (MSL) occurs when students use their mobile devices to transfer their learning from one situation or context to another (Wong, 2012). MSL can occur across different dimensions including: different locations such as home and the university; between formal and informal learning and from individualised learning to learning with others (for a discussion of ten dimensions see Wong and Looi, 2011).

In the context of UK university students, learning alone or together in a physical space on campus is still a significant part of their experiences. While the amount of time spent by students in a university lecture theatre, seminar room or digital learning zone may not represent a significant proportion of their week in terms of time (Handal, MacNish and Petoc, 2013), there is still a role for being together in the same 'physical' space even in an increasingly online, learning at distance and off-campus 'university experience'. Facer (2011) advocates the continued value of physically coming together within the increasingly digital dependent world. Facer sees this as important 'to counter the inequalities and injustice of the informal learning landscape outside school' (p.28) and university. However, the increased 24/7 access to the internet that students' personal mobile devices afford has meant that learning occurs in physical spaces where students are simultaneously connected to other spaces and places. Glassman and Burbage (2014) have discussed how teachers and students may be positioned differently to take advantage of the opportunities that this presents.

As well as spaces for learning becoming increasingly diverse, students are arriving at university with different levels of 'digital literacy' based on prior experiences at school/college. This diversity can also result from habits of using digital devices in social contexts: at home, on an individual basis, with friends and peers; the latter being particularly important as a form of 'horizontal knowledge' transfer. Being digitally literate involves different levels of technical, affective and cognitive intelligence. By being technically literate, we mean being able to competently use different applications and work between different digital devices and external hardware. Being affectively literate means the ability to understand how digital media and devices can affect individuals emotionally. Cognitive literacy is the ability to 'learn' with devices from different media by curating, consuming, collaborating and creating knowledge. The ability to critically engage with media is a key aspect of digital literacy or what has been called 'digital media literacy' (Buckingham, 2007). The term 'digital competence' is preferred by Ferrari, (2012) who defines it as

> *'the set of knowledge, skills, attitudes …. that are required when using … digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socialising, consuming, and empowerment'* (pp. 3-4).

Although studies suggest that students are arriving at university with a digital confidence, this does not necessarily translate into a broad range of uses of technologies in learning. McNeill, Diao and Gosper (2011) report that students' uses of digital technologies can still be 'conservative' resulting in them valuing familiarly, ease of access and the ability to connect as important. Studies providing opportunities to expand students' digital repertoire during university sessions tend to focus on trialling and reviewing additional devices, software or resources. For our study we focus our attention on how lecturers and students conceptualise learning with (and without) technology.

Although published nearly ten years ago, the study by Green and Hannon (2007) resonates with our research interests, in that their advice is to 'start with people not PCs' (p.53) if we wish to understand learning, learners and mobile technologies. Attitudes to the use of mobile devices in learning sessions can be negative (see Campbell, 2006). Hammer et al.'s (2010) study of students' uses of mobile devices for non-academic purposes during lectures identified a 'cognitive dissonance ' in relation to attitudes;

students know their behaviour is a distraction but feel it is legitimate. Sharples and Kukulska-Hulme (2010) have described the use of personal devices by students as both motivating on the one hand but disruptive on the other.

To conclude this section of the paper we acknowledge prior studies and thinking about students' prior experiences of technologies and their diverse uses of them in university studies, the interest in new ways of conceptualising spaces in learning when mobile technologies are present and finally the perceived need for a continued role for face to face encounters in learning.

Methodology and methods

As we were interested in "people not technologies", as expressed in Green and Hannon (2007), the study was designed as a qualitative study with a focus on mapping (Martin and Kamberelis, 2013) students' spontaneous uses of the mobile devices they brought with them to university-based seminars. Working with the rhizomatic principle of mapping (see original work by Deleuze and Guattari, 1987) we wanted to move beyond 'representing' the situation in seminars with a more productive, potentially transformative purpose in mind. Deleuze and Guattari (1987) suggest that reality is constructed of 'lines of articulation or segmentarity, strata and territories; but also lines of flight, movements of deterritorialization and destratification' (p.3). Whereas lines of articulation represent factors which are restricting and normalising, lines of flight open up new possibilities which can counter prevailing discourses. The approach is therefore useful in attempting to make visible the complex and multiple connections operating horizontally between students and their personal mobile devices and between themselves and others in physical space e.g. a seminar room and the virtual connections afforded through their devices.

The sample for the study consisted of 68 students, at one UK University studying across two programmes (18 from BA (Hons) Primary Initial Teacher Education and 50 from BA (Hons) Education Studies). The data collection occurred within five timetabled two hour seminars on each course and our methods were designed to mirror the kinds of learning activity that would typically be used in seminars. Gee and Hayes (2011) emphasise the importance of oral language in digital communications and taking this on board, we captured students' self-reports in modes reflecting those present in digital media (i.e. individual, collaborative, oral, visual, written). An example of this phenomenon was that time was given, at the end of seminars, for students to reflect on their learning, in a self-chosen mode and using their preferred medium (digital or not). Data were generated in three main ways and analysed as follows:

(a) *Researchers' field notes*: These were created during observations of students' participation in seminar activities e.g. a self-directed research task. The field notes were transcribed and then both researchers reflected on them immediately to identify commonalities and potential lines of further enquiry.

(b) *Seminar 'products'*: We carried out a thematic coding of a sample of the students' 'work' produced within the seminars. These products included group posters and annotations of photographs of different learning spaces within the university (incorporating a range of learning technologies).

(c) *Students' written reflections on learning*: We asked students to respond to open-ended questions regarding learning preferences and choices regarding learning with or without digital technologies.

The research generated data in these three distinctive ways (a-c), however, we remained attentive to potential cross connectivity between data sets which was a characteristic of our interest in 'lines of flight' inspired by Deleuze and Guattari (1987). Part of this approach was that we prioritised students' own perspectives on their learning. We predicted that students' preferences and perspectives on engaging with digital technologies in their learning were likely to be distinctive and different from that of their university lecturers.

In the following paragraph, we review briefly the influences on our methodology and methods from researchers who focus on 'student voice'. Within Fielding's (2001) four-fold typology of student participation our values resonate with his depiction of 'student as co-researcher'. In this approach to researching with students they are encouraged to become more actively engaged as discussants, reflecting with researchers on the collected data, rather than being merely used as a source of data in academic research. We thus sought to avoid situating students as passive providers of raw data to be interpreted through the gaze of an 'other'. In seeking a new line of flight that could potentially unearth new ways of students using their mobile devices, we concur with Fielding and Prieto (2002) who

> *'...regard it as crucial for student perceptions and recommendations to be responded to, not merely treated as minor footnotes in an unaltered adult text.'* (p. 20).

Given the dual role of the researchers as the participant-students' tutors, particular attention was given to gaining informed consent and to adhering to ethical principles for educational research. The study was designed in accordance with the British Educational Research Association Ethical Guidelines (2011). We sought to reassure students that their participation with us in the research did not impact on their assessed work for the module they were taking. Additional attention was given to the particularities of researching m-learning which have been problematised valuably by Wishart (2013). Issues raised by Wishart, such an inadvertent surveillance by researchers when institutional devices are used in research studies, were avoided in that our study invited students to reflect on their uses of their personal mobile devices. As such the

power resided with the students as to what was shared or not. Wishart's principle of embedding negotiation of research processes into studies of mobile learning, was, however, put into practice.

Data presentation and analysis

In this section we set out our approach to gathering and analysing data in our small scale study. A detailed discussion is provided in the next section organised around three overarching themes mapped from across the data sets, namely: i) learning spaces, ii) border crossings and iii) conceptualisations of learning.

One data generation activity (which was justified within a module where rather than whose learning objectives covered aspects of digital technologies and their impact on languages and literacies) in one of the five seminars involved students in designing a poster to represent their findings from a personal research task. The task required students to provide a mind map of the implications for educational practice of children's literacy practices in and out of school. Students were asked to reflect on their processes of researching for ideas on this topic. These processes tended to indicate similar approaches across the two groups of students. In the words of one student (from our field notes): "*we all used Google*". We noted with interest that there was a consequence of this, probably predictable approach, which was that one student reflected that most of her sources were from educational contexts in the USA. As tutors, we noted that perhaps, although students were familiar with extracting relevant sources from the internet, their critical literacy skills could still be developed in some ways.

Examples of posters which were products of the activity mapping findings of research studies focusing on children's literacy practices in and out of school included the following (**Figures 1** and **2**):

These two posters illustrate some issues which we believe were significant for our study. **Figure 1** was notable in that it responded to the task in the way requested – via the production of a paper poster but it reflected the methods used in collecting the information. Icons were used (in the 'home' symbol at the top and the 'search' button at the bottom) reflecting a transfer of symbols from digital interfaces to the poster format. Whether this was a conscious choice or a mere reflection of how the poster-designer moves seamlessly between virtual and real worlds / digital and paper was unknown. The theme of 'transfer' is explored in more detail in the discussion section where it emerged as a recurring rhizomatic theme from within and across other data sources.

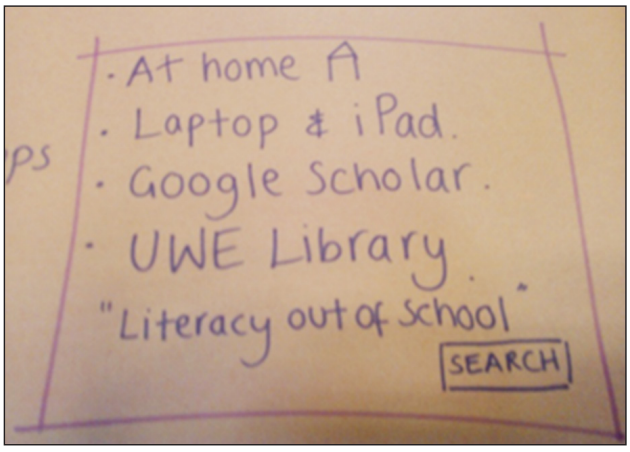

Figure 1: An extract from a group poster showing how ideas were gathered.

Figure 2 demonstrated a more artistic approach to poster design with the core of the image and ideas being represented as a tree, with research informing the content being represented as a swing hanging from a branch on the tree. We include this poster in our brief discussion of this data in that it was the product of some intensive research and discussion work by the group and it was valued by peers when it was shared. This experience caused us to reflect on whether any increase in digital engagement with academic work in seminars would, potentially, reduce students' opportunities for spending time conceptualising an area through representing it in a creative, artistic medium such as images and written text organised in individual ways on a poster.

Following on from the poster creation activity in the same seminar we asked students to 'capture' their work in some way using their mobile devices (mainly iPads and phones). **Table 1** lists the ways in which students chose to capture their work and the numbers indicate how many individuals chose that method. Taking a photograph was the most popular and visual methods generally were more favoured by students than literacy-based ones. After this activity some spontaneous discussion between the students led to one student saying "Facebook isn't for academic work" – Field notes). Some of the student's peer group disagreed with this opinion but it was not an isolated instance and revealed to us a rather 'compartmentalised' attitude towards digital resources which may be present in some students' minds. We discuss the proposition of there being (self-created) borders between uses of technologies and learning spaces in the next section.

In a third seminar, and in the context of the module learning outcomes, the students were exploring how literacy and language development could potentially be influenced by the site of learning, for example where children choose to carry out reading for pleasure. Utilising this theme we invited the students to examine their own preferences for learning within digital learning spaces, both formal and informal, at home and in university. The provision of computer-based learning spaces and rooms in universities and their effect on students' learning was of interest to us as researchers (Brett and Nagra, 2005). Part of one task asked the students to evaluate from a personal perspective whether or not specific spaces available in the university provide valuable opportunities for learning. Students were invited to annotate a number of photographs of spaces with digital devices within the rooms including the seminar room in which they were for that particular seminar. The students could annotate the photographs in any way they wished and without the need for declaring their names. Photographs 1-4 are some examples of the spaces.

Figure 2: An extract from a poster showing both ideas relating to the topic (right-hand side) and sources consulted and devices used (left-hand side).

Approach	Number of students choosing this approach
Taking photographs of the completed posters and graphic organisers (completed by hand on sugar paper and used for a gallery presentation)	12
Using a voice recorder	3
Creating a voice memo	2
Making a short video story using the photographs and set to music chosen by the students. Flipagram see http://flipagram.com/	2
Creating a Vine (looping video) see https://vine.co/	1
Making a mind map using a mind map app	1
Sending a text	1
Creating a panoramic photograph	1
Making a note	1
Uploading photographs to Facebook	1

Table 1: Self-selected methods of capturing seminar work (in one seminar group of 25 students).

Photo 1: The seminar room used by 2 of the 3 groups in the study.

Photo 2: A freely available source of PCs in a corridor.

Photo 3: A 'class set' of IPads.

Photo 4: An open learning room (known within the student cohorts as the 'Facebook' room).

As might be predicted, students responded in diverse ways to these four images, reflecting their individual preferences for spaces, devices and approaches to learning. A prevalent response to **photo 1** was that it looked rather 'school like' and reinforced a teacher-pupil room layout. Students expressed the view that if the desktop computers were used then the students would in fact have their backs to the main group and their tutor. The only positive responses to this photo related to the desks which students noted were big enough to support discussion and group collaboration.

Photo 2 showed a set of 'walk up' PCs in a corridor available for any students or staff members to make use of at any time. These were evaluated as being valuable if needed but only for short information searches and for purposes that did not require privacy. This is likely to match the intentions of the university planners who decided to create this resource.

Photo 3 generated a diversity of views relating to whether or not the university should provide resources such as iPads which can be used within seminars. The students' views were divided between those who preferred to use their own device to those who appreciated not being expected to use their own finances to fund purchases of tablet computers. This challenge seems to be an interesting one in terms of expectations of students and also of whether universities can or should make assumptions about what they should provide and what students themselves should fund.

Photo 4 shows a recently created space in one of the buildings used for teaching. It quickly gained the name of "Facebook room" amongst the students themselves due to a perception of the use of the room. The colours, relaxing furniture and seating arrangements all gained comments from the students in the study. These comments were largely positive but some negative comments included a dislike of the noise and consequent impossibility of working alone. This photo provided the richest opportunity for scrutinising any potential "gap" between students' preferences for suitable learning environments and the university's conceptualisation of their needs. It will be interesting to maintain an evaluative eye on how uses of space evolve within the university contexts at the same time as how mobile technologies are used, in diverse ways, by learners and tutors.

In the penultimate seminar students' self-reports of how, in their words, they prefer to learn were part of the seminar activity. In keeping with our observation notes we learnt from these written responses that students appreciate working in groups on tasks that produce tangible products such as posters. Interestingly, one student noted that their reason for this preference was because "we learn through doing" and a poster was a way of "doing" in terms of discussing and recording ideas. Another student reported that as, in their view, schools still used poster design as a learning activity, then it is useful for them, as potential future teachers to keep in touch with this as a teaching tool.

Students expressed diverse views on whether they should be "taught" about the facilities on their mobile devices such as phones and tablets. This question was raised by us after we noted in seminar activities that not all students knew about, or had used, all of the facilities on their phones. These facilities included voice recorders and a variety of apps with potential for educational uses e.g. mind mapping. Some students said they preferred to find out by trial and error whereas others agreed that there could be a benefit for university tutors introducing students to facilities and apps and directing them to use these resources in university-based learning.

The notion of the 'digital native' was well-known to students, and as such some supported their responses on how they preferred to learn with technology in relation to whether they perceived themselves to be digital natives or not. For those who did regard themselves as digital natives their responses leant towards not wanting university provision to include teaching about technologies and their uses in education and the reverse was the case for those not identifying as digital natives.

In the final seminar which was part of the research we returned to our tenet of students as actively involved in the research. Their genuine interest in how we were progressing and what lines of enquiry were emerging allowed us, through informed but informal discussion, to raise

some of our initial findings for participant verification and clarification.

In the section below we move to a more detailed discussion of our data in relation to three themes we identified as running throughout and across the data sets.

Discussion of Theme 1: Learning Spaces

We noted in our study that there was a certain amount of bemusement when we, as university tutors, asked students about how they used their mobile devices. There was a sense that we were moving out of traditional territory and doing something that tutors did not typically do. The device each student had and which they regularly used for university work in an open manner seemed to belong, perhaps to the private or personal realm or space, and, as such, it struck an unusual note for us, as tutors, to take an interest in when and how students used their mobile devices. We feel that it would be valuable for further research to take place into how learners and tutors in Education make use of individual, shared, face-to-face and virtual learning spaces and the roles that digital technologies can and do play.

Students' uses of their personal devices raised the issue of whether they maintained strict boundaries between using these devices for university work purposes or other purposes. In our study, some students admitted being able to switch between 'in seminar activities' and 'out of seminar activities' such as checking Facebook, sending messages and updating their status. This seemed accepted practice among many students in our study which supports Hammer et al.'s (2010) findings. Although one female participant noted:

> F7 "I do mind when they [other students] have it on sound so the noise of messaging and whatsapp can distract me."

This raises questions about the attitudes and behaviours of lecturers and students in shared, formal, timetabled, 'physical' space where mobile devices are 'at hand'. How do individuals, both lecturers and students, respond in university sessions when faced with a culture of 'continuous partial attention' (Hammer et al., 2010, p. 301) or Gergen's (2002) concept of 'absent presence'?

Discussion of Theme 2: 'Border crossing'

Much literature on the uses of digital technologies builds on the concept of a 'digital divide' which can be understood as the distinction between generations on the one hand (those who have grown up using digital technologies and those who have not and who therefore 'struggle' with their use) and those who, for a range of other reasons, are not engaging with digital technologies. The discussion in this section, drawing on all data sets, suggests that the concept of 'divide' is a salient one for the participants in this research. However we note the emergence of a divide which operates on more than just the level of users versus non-users.

The first understanding of the concept of divide is applied to a range of views expressed by individual students participating in the study who described their engagements with digital resources in a way which demonstrated a clear compartmentalisation. This compartmentalisation meant that certain resources were accessed for distinctive functions only and these functions were divided between university study purposes and social life purposes. So, rather than a digital divide existing between groups of users and non-users, the divide apparent here is within the individual but between different parts of their life. The quotation from the female student above (F7) indicated that some students crossed the border and 'switched' between social use and university-focused use within sessions.

From our field notes, one student, when offered the chance to reflect on their learning in a seminar using any digital medium, shared the fact that she would not have considered using Twitter as, although she was familiar with it, she used it for "stalking celebrities". In fact, following this brief exchange with the tutors, she did choose to collaborate with her peers to produce a tweet reflecting on their perceptions of the seminar session. This outcome seemed to be appreciated by those involved in generating it. It suggests that a role for university tutors in a digitally enabling environment might be to explore students' uses of digital resources within taught sessions and to encourage a degree of 'pushing the boundaries' as it happened in this instance.

A similar example, also from field notes, involved a student in a different seminar group responding to the same tutor invitation to capture her reflections on the seminar in some way using her mobile device. Her expressed wish was not to use Twitter for reasons of a fear for 'security'. One of her peers suggested that there were ways in which Twitter could be limited to a specific group of individuals but this did not persuade a change of mind. The first student conceded that the group did have a Facebook group to share information between them. However, the use of Twitter for university study purposes at that time did not appear to be a realistic or desirable opportunity to her.

Students reflected not only on their own uses of mobile devices in learning and in other parts of their lives but also on uses of mobiles by their families. Some examples shared included grandparents communicating with friends and other family members using Facebook and students shared these examples in a tone of appreciation mixed with surprise that this was taking place. This perhaps reflects an undercurrent of belief in a 'digital divide' between age generations and the surprise stemmed from counter-evidence for this phenomenon. Two different examples involved students sharing their apparent scorn for their perception of their parents' contradictory behaviour in firstly wishing to have the 'latest' phone while secondly only using a very limited range of potential facilities of the devices. A specific example came from a student who noted with disdain that her parents only used their phones to "play Candy Crush" with each other.

This example suggests that students in the study had a sense of 'proper' uses of particular devices and resources. In terms of university study it may be important for a

certain disruption of these beliefs which are developing organically within students' lives in and perhaps mainly outside of their university experience if they are to make full use themselves of the wide range of resources available to them in their learning.

Discussion of Theme 3: 'Conceptualisation of learning'

As already stated, the initial aim of the project was to explore students' spontaneous uses of their mobiles in their university learning. Learning, therefore, was always strongly anchored within the research focus. In each data set students' conceptualisations of learning featured, whether associated with particular technologies or not and we feel it appropriate to consider all student conceptualisations of learning within this paper. The reason for this decision is, we suggest, that if we wish to explore students' uses of devices in learning we will have a better insight into their actions if we understand what learning means to them.

In data set c, the students' written reflections, there were examples of students reflecting on their learning preferences both in global terms and also in terms of using mobile devices. As part of the seminar the students were asked to reflect on not just their substantive findings relating to the theme but also the methods they used to gather ideas (e.g. Wikipedia? Blackboard? Database searches?). More than one participant noted that they had enjoyed the activity but had "not learned anything". This reflection leads us to think about what, in fact, students might consider to be the defining features of an effective seminar event in terms of learning. Findings discussed earlier in the paper might point towards a valuable exploration by university tutors and students of their uses of technologies and the affordances of technologies, with a particular emphasis on education sector specific uses, given students' likely future careers as teachers. However, the student self-reports appear to indicate little appetite for such activities.

Experiences in seminars of developing a response using a technological medium e.g. a mind map app led to students reflecting on their seminar learning preferences. Data set c contained several responses showing an appreciation of learning with peers. This was linked by some to a query about the value of using iPads in seminar contexts in that a student noted that "posters are still a more instant visual display where work on an iPad etc. is still restricted to being viewed online". It seemed that being able to share work in a visual way was important to the student in question and so future effective uses of new technologies could take account of their wish.

The idea of working with mobile technologies and paper (including sugar paper) is noteworthy, particularly how students are using 'personal and to some extent private space' on mobiles before and in sessions for research but may prefer to present their shared outcomes through pen and paper. We suggest that a possible reason for this is that students have been inducted into a 'Poster culture' as a valid assessment/seminar approach and that had become difficult to detach themselves from tutors' preferences, the physical and technological environment, students' prior learning experiences or a combination of all of these aspects.

Conclusions, implications and recommendations for research and practice

Our experience as Education lecturers, researching our educational practices, is that undergraduate students routinely arrive at timetabled 'formal learning' sessions with their mobile devices available and to hand. Our research experience, on the other hand, suggests to us that for those leading or facilitating face-to face educational encounters in taught seminars, the pedagogical principles on which the use of personal mobiles devices is encouraged or not needs to be revisited, reviewed and rationalised. In this small scale research study we sought to map students' spontaneous uses of their mobile devices at a particular time and in the context of the discipline of education. Our research approach sought to build in authentic student voice on use of mobiles in seminars and an outcome of this was to see the extent to which diverse experiences, preferences and beliefs were present within a relatively small cohort of students.

The students in this study valued opportunities to work collaboratively through multimodal approaches and while comfortable with preferred ways of using their mobile devices they were less secure or convinced of the value of alternative approaches to engaging in learning activities and presenting their outcomes in sessions using digital-enhanced approaches. Where students were open to experimentation and new ways of working with technologies this produced some creative conversations concerning the use of mobiles for learning. However, how long these new ways of working, for example, moving beyond curating (taking photographs of group work) to creating (producing looped video summaries of their research) lasted was not determined.

The catalyst for this study was Green and Hannon's (2007) research, but it is from 'their space' (ibid.) that we suggest it is 'our space', the physical places that students, academics and others come together in more formal learning situations, that demands closer attention. If learning with mobiles in timetabled, taught sessions is to be beneficial for both students and lecturers, then, it is important to establish a shared understanding of the nature, purpose and extent to which using personal mobile devices is encouraged or not and the pedagogic rationale for this.

In future, longitudinal studies would be beneficial in allowing researchers to track how any group of students develop their spontaneous use of mobile devices in their learning. These studies could valuably extend our current understandings of the themes explored in this paper, namely learning spaces, borders and crossings in relation to using mobiles and conceptions of learning. We suggest that this work would benefit the learning of all university students in relation to their learning in Higher Education. We believe there would be particular benefits for those students who intend to develop their own career in a specific sector of Education given that technologies permeate the lives of learners of all ages.

Competing Interests

The authors declare that they have no competing interests.

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