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Social Mobile Devices as Tools for Qualitative Research in Education: iPhones and iPads in Ethnography, Interviewing, and Design-Based Research

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Abstract

This paper's focus is on the development of research methodologies to investigate learning in higher education. These methodologies have made use of Social Mobile Devices (SMD) for data collection, a relativity new concept in qualitative research. The paper provides examples of practice linked with discussions from the Learning Without Frontiers Conference 2011 (LWF 2011) around the constraints, affordances, and ethical issues inherent in the use of SMDs for research. While the researchers used Apple iPhones and Apple iPads, this should not limit the applicability of the paper to other devices. It is hoped that this paper will aid the development of these tools for research purposes in the future through wider discussion, use, and dissemination. Technological development of SMDs continues unabated, hence developing methodologies around their use is an important task that will enable researchers to take advantage of the future applications they provide, whilst being aware of their impact upon the research process.

Keywords

Social Mobile Devices; Educational Research; Methodology; iPhone; iPad; Mobile Ethnography; Interviews; Design-Based Research

Introduction

Social Mobile Devices (SMDs) have become ubiquitous throughout society, largely due to their communicative abilities, and they increasingly provide additional functionality. Capabilities include, but are not limited to, media capture and creation; data collection; sharing and storage opportunities; and connections to wider networks via the World Wide Web. This functionality makes them a necessary compass with which to navigate the digital knowledge society. However, their usage should not be limited to social or business contexts. These unique qualities allow SMDs to cross boundaries both within and between the different social worlds we inhabit. Within the realm of education, exploration is taking place which investigates the opportunities in learning that SMDs provide and their role in the area of research and practice.

For the purpose of this paper, SMDs are defined as those portable devices with the capabilities already outlined. They are often personal and used for a variety of roles within our lives - depending on our needs. The two main groups of devices falling into this category are smartphones and tablet computers. An argument could be made for including some laptops and even certain game consoles, but these do not always feature cameras or are not small and light enough to make observations while on the move. In this paper the iPhones used were the personal communicative devices of the researchers, while the iPads provided both working and social platforms.

This paper's focus is upon the development of research methodologies to investigate learning in higher education in order to progress pedagogy and technology-enhanced learning. The integrated functionality of SMDs makes them attractive research tools to capture data within these settings. We explore the roles, affordances, and constraints these tools play in educational research settings via three examples of practice, supplemented with commentary recorded at a recent conference.

At the Learning Without Frontiers Conference (LWF) in January 2011, the primary author presented the use of an iPhone 3GS as a research tool in a mobile ethnography (Beddall-Hill, 2011). The presentation was conducted as a roundtable session with two twenty-minute periods delivered to small groups of delegates. The key aim for the author was to further develop the methodology and create an ecology of resources (Luckin, 2008). These sessions were audio-recorded with informed consent and a summary of this feedback was added to the background and discussion sections of this paper. The following questions were used to stimulate discussion with the delegates following the presentation.

1. Do you know of any closely related research, or can you suggest any suitable references for digital ethnography and visual methods?
2. Have you used the iPhone (or another device) for research purposes? If so, what experiences could you share?
3. Can you suggest any applications you have found useful for conducting research?
4. Are there any further issues in using this device as a tool for research, which have not been considered?

Overall, the delegates found that the notion of using a SMD (such as an iPhone) as a research tool was not a new concept. However SMDs had not been commonly used within this group as such, especially for qualitative research. Only one delegate was using his SMD as a research tool for interviews and hence provided the second example of practice in this paper. The other delegates had only informally experimented with SMDs or were considering them as potential research tools for the future. Nevertheless, these sessions proved very useful in both the discussion they stimulated and the resources that were suggested.

Three examples of practice are provided in this paper, which describe the use of SMDs in ethnography (Beddall-Hill), interviews (Jabbar), and design-based research (Al Shehri). Before reporting on the examples and discussing the commentary from the conference, some background on the use of SMDs in research is provided, alongside other closely related areas of work.

Background

Mobile devices have a plethora of uses which encompass social interaction, GPS positioning and mobile purchasing of music and e-books. Kukulska-Hulme and Traxler (2005) believe that as more sophisticated mobile devices have appeared in recent years, the significance of mobile learning has radically increased. Mobile devices have started to become multifunctional tools, combining the roles of what previously required several separate devices, with each performing a specific role. These roles include the use of digital cameras for capturing visual media, handheld game consoles for games on the move, audio players for listening to music or the radio, laptops or PDAs for processing data and reading emails, etc. Now, these functions and others are being amalgamated into smartphones. Many researchers see the

potential of these wireless SMDs to achieve large-scale impact on learning due to their portability, low cost, communication features, multi-functionality, and ubiquitous nature (Rochelle, 2003).

Much research around mobile learning makes use of data collected from the devices while they are being used by the research participants. van 't Hooft (2007) suggests a variety of ways to collect data from mobile devices including; spatial and temporal data, patterns of use, learner data (such as context-created or accessed) and connectivity data (i.e. who the learners share and connect with). These devices are often supplied to the participants as part of the research and might be considered 'borrowed' devices being used for education or work as opposed to 'personal' devices chosen for social use. Hence, while mobile devices are commonly used in research, the use of personal SMDs as data collection devices is more limited, especially as qualitative observation tools belonging to, and being used by, the researchers themselves.

Researchers are beginning to consider the potential of their own SMDs as research tools, due to their portability and, increasingly, affordability. This makes them appealing for the storage and development of research, particularly when conducting research outdoors and on the move. They allow for the capture of multiple data types, provide access to wider networks, and can make backup of data easier and faster. This helps preserve research data in an efficient and timely manner. The examples described in this paper used SMDs as research tools, specifically the iPhone 3GS (16GB) and the 1st generation iPad (16GB) with Wi-Fi. The use of smartphones as data collection tools is a relatively new sub-area of mobile research methods. These are methods that enable the researcher to observe in fluid settings that might involve participant movement such as walking or cycling outdoors (for example Brown, Dilley, & Marshall, 2008). Smartphones have been cited as ethnographic tools in a seminar presentation by Coutas (2010) and informally on blogs, where their potential use has been discussed, but little published work on their role in such research settings exists. There are many more studies that use SMDs as a quantitative tool (see e.g. Geltz, Berlier, & McCollum, 2010; Hamou et al., 2010). However, using SMDs could be invaluable within qualitative research if suitable methods and applications were developed.

In 'Mobile Methods and the Empirical', Urry and Buscher (2009) link the wider work on 'Mobilites' by Urry (2007) to the use of mobile methods for researching this area. They suggest that mobile methods enable researchers to stay in motion with participants. They term this co-present-immersion, as the researcher can move within different modes of movement and use a variety of methods for data capture and observation. Traxler (2011) adds to this by suggesting that the biggest benefit of mobile methods (with particular reference to SMDs) is their ability to stay 'in-world' while observing mobile learning instead of evaluating its role once researchers have left the field. It also keeps the students in-world, commenting as they work instead of forcing them to reflect on what happened after the event. This allows them to demonstrate more clearly the processes they were involved in during learning and may help eliminate bias or include things that might otherwise have been forgotten. Research by Brown et al. (2008) describes how walking using head-mounted cameras enables a digital presence and how such use is a key mobile method that enables in-world data collection even when researchers cannot be with their participants.

The first practical example below, 'mobile ethnographies of learning in the wild', describes the use of a head-mounted camera and SMDs (iPhone) to stay in-world with participants during ethnographic research (Beddall-Hill). The other two examples of practice provided in this paper include the use of SMDs (iPhones and iPads) for interviews (Jabbar) and design-based research (Al Shehri). Each case deals with the qualitative examination of learning processes in higher education. The format of this paper uses the questions posed during the conference session to guide the format and later discussion of the examples. Each example illustrates the use of SMDs for qualitative research purposes, giving a description of the research and why particular tools were chosen. They then reflect on what was learnt from using these tools, drawing out lessons for best practice whilst also considering the applications found to be most suitable for the tasks. Finally each example concludes by discussing the issues that were encountered in using these tools. The final section of the paper provides a discussion of the examples, feedback from conference participants on the issues inherent in using SMDs for data collection, and comments on potential future use of SMDs in research

Example 1: Mobile Ethnographies of Learning in the Wild

Research Aim and Approach: Mobile Ethnography

The introduction of digital technologies has changed the way we tell the stories produced by ethnographic research (Murthy, 2008). While we can still produce vivid accounts, researchers now have a wide variety of tools upon which to draw, but how, what, and where to use them, and how to weave together the rich fabric of the story they are capturing can produce challenges. The tools of interest in this example produced large sets of mainly visual data. Developing methods to deal with visual analysis is relatively new and visual sociology itself is a growing field (Flick, 2006). Far more information is available about analysis of photographs and film from television, but the qualitative analysis of interaction, especially around technology, has been written about less. It is inherently difficult to capture and re-tell a story, despite the detail which visual methods provide. This is due to potential bias in their representation through choices made by the researcher, who will inevitably leave out details which in hindsight may have been important. Furthermore, influences outside the recording and other sensory experiences are lost within this data. This is where a multi-modal approach of using observation and a variety of digital research tools to collect different types of data (Dicks, Soyinka, & Coffey, 2008) can provide a fuller, albeit more complex, picture.

The emergence of certain technologies has changed many of our social and work activities. This, in part, has led to an interest in how we operate in these mobile settings. Ricketts-Hein, Evans, and Jones (2008, p. 1279) believe that there is a growing emphasis within the social sciences on materiality, embodiment, and the importance of place and movement; mobile methods of research aid this agenda. When mobile methods of research are used, both the researchers and participants are in movement within the research setting. These methods allow researchers such as Ricketts-Hein et al. (2008) and Beddall-Hill (2010) to explore the ways in which people see and relate to the world around them when in motion through the use of a head-mounted camera. Ricketts-Hein et al., (2008) suggest that current developments will have a lot to offer in terms of capturing this experience, especially with the growth of mobile phones with built-in cameras and GPS, added to the increase in location-aware social media and applications. They do, however, warn of the need to consider issues of privacy and surveillance and the need to explore more deeply the difference these methods make, especially in regard to traditional methods, if they are to progress and be appropriated in other disciplines.

Mobile Learning in the Wild

Data was collected during three ethnographic observations of residential geosciences field trips in which students employed mobile technology for their own data collection while in the field (Beddall-Hill & Raper, 2010). These devices were mainly specialized global positioning systems (GPS) devices which belonged to the university and were termed institutional devices. The original premise was to consider the affective and technological issues surrounding the devices which may afford or inhibit learning practices in a collaborative setting. As such, the study was concerned with the social construction of knowledge and mediations with the natural world that the mobile technology may or may not have influenced. Contrary to this initial more techno-centric assertion, analysis of the data collected from the three field trips so far is demonstrating that the students themselves have an equal or more powerful influence. The way in which they appropriate the technology, which is seemingly affected by perceived ownership, may be a key consideration when designing for learning with technology.

Mobile methods of data collection were used to observe the students interacting around the device (often one institutional device shared within a group). A key method to collect data was the use of a head-mounted camera that the user of the device wore (see Beddall-Hill, 2010; Brown et al., 2009). The other digital devices - which included a video camera, camera, GPS tracker and voice recorder - used in earlier cases alongside the head-mounted camera, were seamlessly replaced by applications on the iPhone in 2010.

Mobile Devices Used and Reasons for Use

Table 1 outlines the three different field trips observed, the types of data collected and the tools that were used. During the first field trip, a variety of digital tools was utilized but as time, circumstance, experience, and technology progressed, fewer tools were needed. By the third field trip, the functionality of the iPhone had replaced the majority of the tools.

Table 1: Similarities and Differences between Digital Technologies Used on Field Trips to Collect Data

Categories of Comparison	**Field Trip 1 within the UK in 2009**	**Field Trip 2 within a Mediterranean Country in 2009**	**Field Trip 3 within the UK in 2010**
Students	6 (4 male, 2 females)	10 (6 males, 4 females)	10 (7 males, 3 females)
Total data in GB	17.88 (this does not include footage from observations undertaken indoors)	27.30	20.45
Types of Data Collected			
Video clips	Head-mounted camera, Video camera, digital camera	Digital camera	Head-mounted camera, iPhone 3GS
Photos	Digital camera	Digital camera	iPhone 3GS
Audio clips	Voice recorder	Voice recorder	Voice recorder and iPhone 3GS
Field notes and researcher diaries	Laptop and digital camera for video diaries	Laptop and digital camera for video diaries	iPhone to record audio and video diaries
Focus groups	Video camera	Voice recorder	iPhone 3GS and voice recorder
Questionnaires	Paper-based	Undertaken by host institution	Paper-based

Device Use and Performance

Field trip 1: Challenges in collecting data

The weather, light, and terrain were instrumental in directing both the students and researcher in what was feasible for both parties regarding data collection. The digital camera was heavy and cumbersome to record with, but still easier and less intrusive than the larger video camera. It quickly became evident that recording written field notes while outside was almost impossible, due to the weather conditions and the possibility of holding up the students. It also seemed more intrusive and would further portray the researcher as an outsider 'spying' on the group. Instead, it seemed more appropriate to try to blend in and so written notes were replaced with recorded video diaries in the field. The mobile technologies used produced a vast amount of data, which quickly caused storage problems and interoperability issues around the file formats produced by the different devices. This was further hampered by the lack of Internet access to download the necessary software to the laptop, including QuickTime and VLC to view different visual media file formats.

Field trip 2: Some setbacks

Unfortunately the head-mounted camera was damaged at the beginning of the data collection during this field trip and swift changes in the way the data was recorded with the remaining tools had to be made. The majority of the research was conducted out in the field so use of the digital camera and voice recorder were alternated; however, both suffered storage and battery issues. Furthermore, it was difficult to record audio with these tools without being in very close proximity to the conversation being recorded, thereby making it more intrusive.

Field trip 3: An innovation

The protocols for data collection were initially the same as field trip 1 and used similar technologies. However, despite planning and testing prior to the trip, several technological failings early on in the data collection forced new strategies to be quickly employed. The researcher's own smartphone - an iPhone 3GS - was initially employed until the other devices could be made operational. However, it soon became the most valuable data collection tool due to its ability to perform the roles of several of the other devices (digital camera, voice recorder, GPS tracker). Although the voice recorder and head-mounted camera were operational the following day, they were integrated into a new model of data collection with the iPhone as the primary tool. Recording notes in the field and blending in with the group was made easier, reduced the total size of data files, and resolved interoperability issues with the use of a MacBook Pro as the processor. The iPhone's camera captured both photos and video and was much easier to handle than the digital camera. It did lack zoom capabilities, but was similar in quality for sound capture and had a distinct advantage in that the data was automatically geo-tagged, allowing the route taken to be visualized later in iPhoto (Figure 1). Furthermore, the facial recognition software within iPhoto could be used to search for participants.

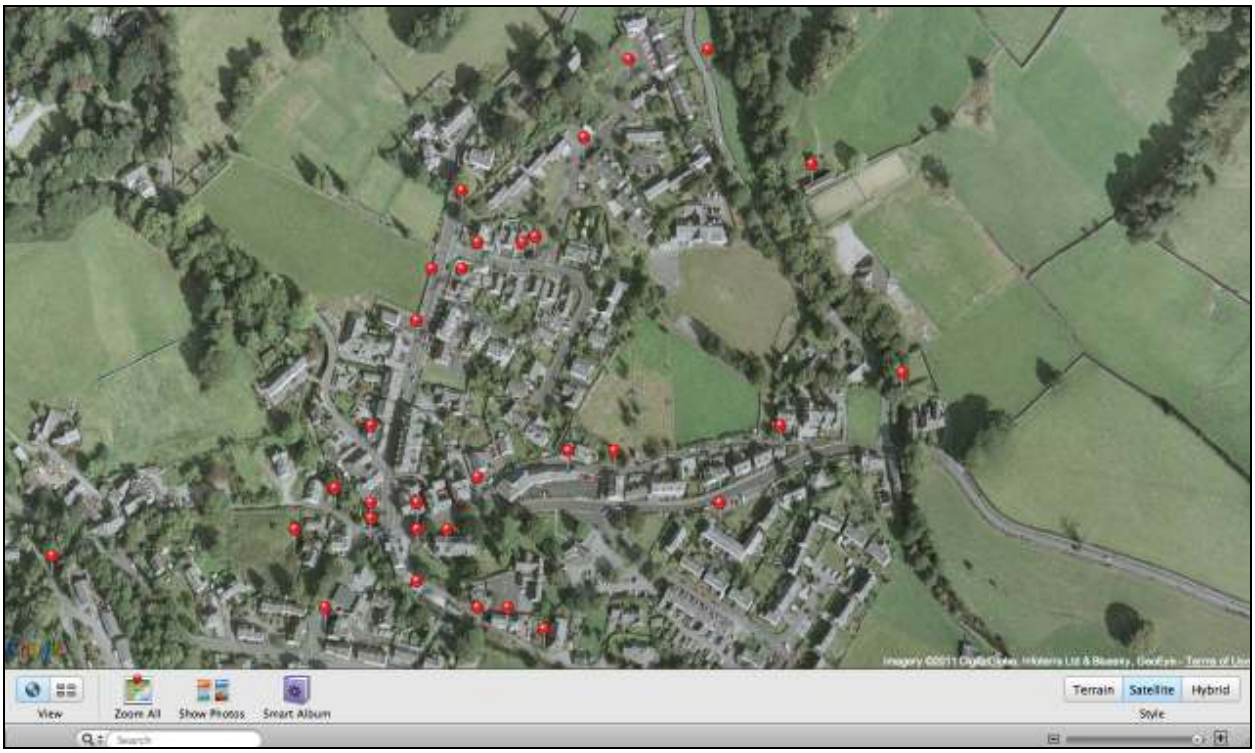

Figure 1: Geo-Tagged Images (Captured by the iPhone) Represented by Pins in iPhoto via Google Earth

Instead of collecting digital video inside with a video camera (as in field trip 1), audio was used as the baseline data because the iPhone or voice recorder could be left on for hours without sacrificing too much device memory or battery power. Of key interest were student interactions in the field and their use of the specialized GPS device. When they were working indoors these interactions were less frequent and hence the audio was a suitable data source. During this field trip, the larger group sizes (four per group) and the students having access to their own laptops meant the group-assigned tasks could be worked on individually, and there was a lot of silent working.

The other built-in applications used included Notes and email. Notes could be used for any ideas that came to mind spontaneously during the observation, and if there was no time to type these ideas they could be captured in audio or video format if they related to the observations. Audio recordings also replaced field notes; they were quicker and easier to record than typing them up later that evening, given the nature and length of the observations (spanning the entire day). In addition, the researcher was often too tired to spend time on further notes. Mobile email and Internet provided communication and support for the researcher, which had proved difficult during the previous field trips due to the lack of Internet access at the sites.

The students had a variety of personal smartphones amongst them, including at least three iPhones. One student suggested applications to use for data collection: a voice recorder and a GPS tracker (PinTrip). The voice recorder captures voice memos which can be named. The PinTrip application is GPS-based and allows a 'pin' and memo (or milestone) to be recorded at a location of choice. For this research, a pin and note were created each time the students stopped in their journey during the work carried out in the field (Figures 2 and 3). Many of the students on this trip used their own mobile technology in different ways to support their work, and not just for social communication. They used the cameras on their phones instead of a separate camera, and the GPS capabilities of the phones instead of or alongside the institutional GPS trackers they had been given. They were confident and comfortable in the use of their mobile devices. This attitude and use of mobile technology encouraged the researcher's use of the iPhone as a data collection tool, and it seemed to be accepted by these students as a valid and suitable method of conducting research.

Figure 2: Pins Visualized via Google Earth Using PinTrip on the iPhone

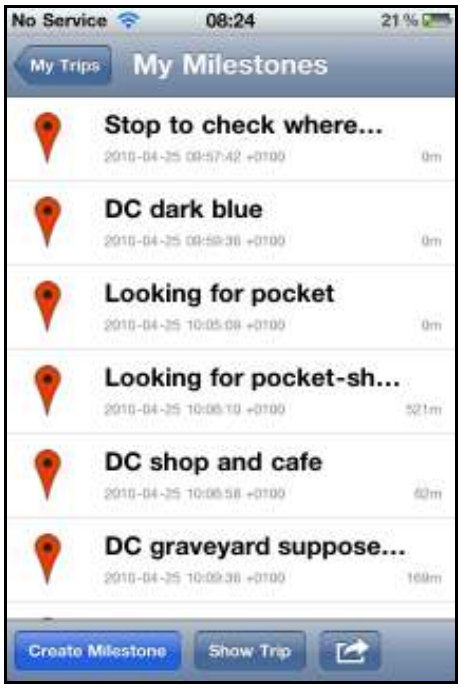

Figure 3: Memos recorded using PinTrip on the iPhone

Sample Evaluation and Issues Encountered

The iPhone was appropriated by the researcher as a temporary technology for data collection; however, it soon became the most important tool. This was partially enabled by the comfortable use of mobile technologies the students engendered and their positive responses to it as a data collection tool. It made data transfer simpler, reduced software clashes, and provided geo-tagged data, integrated applications in one place, and Internet access. In contrast, the iPhone did suffer from loss of signal on occasion. Additionally, it was unable to record or run applications simultaneously, suffered from low screen visibility due to poor light conditions, and risked potential damage from wet weather. With further planning and the Apple iOS4 iPhone software update some of these issues could be elevated for future data collection.

Using the iPhone meant that data could be collected in a relatively unobtrusive manner. Issues around covert surveillance using a 'social' tool need further investigation, as most individuals would not see the smartphone as a research tool and hence may be unaware of potentially being filmed. This was also the case with the head-mounted camera. It is an advantage in many ways for participants to be able to 'forget' about the research and be able to continue with the work they are undertaking (in this case field work) unabated as they might in a non-observed setting. However the device being too invisible might also cause students concern if they say or do something they would prefer to remain personal. For example, during field trip, a student made a tongue-in-cheek comment about the researcher's lack of fitness for climbing when they were apart. However he later realized that the head camera had filmed him and that the researcher would later hear the comment and might take offence. He therefore apologized in advance and commented that he had 'forgotten' he had the head camera filming at the time. This is a lighthearted example of how devices can sometimes be too invisible and therefore cause embarrassment or worse to a participant. Hence, a trusting relationship with participants is essential to enable data collection, as is ensuring their awareness of the technology and empowering them with the option to 'turn off' the recording as they wish. Ultimately the device becoming too invisible can create problems. Especially when students might not want to be recorded and despite consent being obtained, these wishes need to be respected to maintain a trusting relationship.

The students were made aware that they were being recorded at all times in some manner and consented to this, and were able to request filming to stop at any time or in some cases switch off the device being used if the researcher was not present. However, using a phone could have blurred its personal and research uses, and using the iPhone made it more difficult for students to request filming to be halted. This is because they might not always have known if the device was being used for research or personal reasons and a dedicated research device would reduce this confusion. In light of this, the researcher offered the data for shared viewing and reminded participants when the phone was being used as a data collection tool, and of their right to opt out of being recorded in order to build an atmosphere of trust. Students were given the opportunity to censor any data they wished at the time of recording by viewing it or requesting the phone camera be turned off. Even so, the students did not report this as being a concern and felt comfortable being observed with the iPhone. This is a very important outcome and suggests a trusting relationship was successfully built between the researcher and participants, but also that they were at ease with type of research (ethnography) being undertaken. If the students had not felt comfortable they might have exercised their right to withdraw at anytime, hence rendering the majority, if not all, of the data collected unusable. A research phone and a social phone may have sent a clearer message to the students as to the nature of its usage at any given time.

Practically speaking, a smartphone is an expensive research instrument and for planned use researchers and tools need thorough preparation. A separate 'researcher' device would be more appropriate in ethnography so as to avoid confusion on how the device is being used and also to reduce the mixing of personal and research data during data collection. Guidance for good practice includes the regular backing up of data to avoid losing hours of information if the device crashes (although this did not occur on this occasion). It would also be necessary to thoroughly prepare and test applications for research prior to fieldwork and position them in an accessible place on the device's home screen. Finding a method of suitable waterproofing could prove invaluable and prevent possible data loss when wet weather has the potential to halt recordings. The use of an iPhone could be possible while abroad (field trip 3), but data roaming charges might add significantly to the cost (although roaming could have been switched off for some applications).

In sum, this example dealt with mobile ethnography and visual data collection methods within mobile learning. The next example will highlight the use of SMDs for in-depth interviewing, specifically the interviewing of academics to examine culturally responsive pedagogies within higher education.

Example 2: 'Head in the Cloud': Data Collection for In-Depth Interviews around Culturally Responsive Teaching

Research Aim and Approach

The purpose of this research was to explore the lived-in experiences of academics working in higher education and how these experiences may have an effect on pedagogy for ethnic minorities. This leads to investigations which focus on the methods and mechanisms of higher education pedagogy through the lens of a culturally responsive teaching framework (Ladson-Billings, 1995), the main outcome being an understanding of whether, through the learning process, 'culturally responsive teaching' can add value to higher education pedagogy.

Culturally responsive teaching is a pedagogy that focuses on education for social change (Nieto, 1999). Nieto discusses this pedagogy as empowering and validating for ethnic minorities with an emphasis on the development of education that embodies equality and justice for all. This kind of pedagogy will begin to take on further significance as universities increasingly continue to attract students from ethnic minorities. In light of this, the purpose of this research was to explore what role a culturally responsive teaching framework can play in developing a higher education pedagogy that is consistent and free from prejudice.

Investigating the phenomenon of culturally responsive teaching requires tact and trust on behalf of the

researcher. To investigate feelings, methods, and mechanisms, a questionnaire or an anthropological approach may not be appropriate and would not elicit the detail required (Ahmad, 2006). However, in-depth interviewing might prove to be a more suitable method of collecting data. The purpose of the in-depth interview is to focus on the perspective and responses of the interviewee. The role of the researcher within this context is to direct the interview process effectively so as to meet the purposes of the research (Lewis & Ritchie, 2003). Probably no other skill is as important to the research worker as the ability to conduct good interviews (Oppenheim, 1998). In order to illicit deep and meaningful responses, it is critical to spend time with the respondent, going past what the researcher would consider the superficial phase of the interview The interview process needs to be managed carefully to ease the interviewee from the everyday social level to a deeper level at which researcher and interviewee together can focus on a specific topic or set of topics (Lewis & Ritchie, 2003).

Therefore, in-depth interviews were an appropriate choice for this research project with memoing used as an additional method. Memoing and in-depth interviews are a natural fit as memoing is useful in gathering data which is not easily recorded through a voice recorder. This includes gestures, facial expressions and other non-verbal forms of expressions (Leavey, & Hesse-Biber, 2004).

Mobile Devices Used and Reasons for Use

With the interview process in mind, the researcher considered a variety of technologies that would be capable of collecting the data required and were easy to (learn to) operate. When thinking about this process there were three main concerns that had to be addressed, each of which needed different functionality and properties present within the technology to be suitably addressed.

- Concern 1. Which technology will allow for maximum interaction with the respondent with minimal technological disruptions?
- Concern 2. How can duplication of effort and work be minimized?
- Concern 3. How can data security and confidentiality be ensured?

Traditionally, interviewers have used audio-recording equipment which can, at times, be cumbersome and unreliable. In many cases these are plagued by potential backup and storage issues with file size limitations. Taking notes in a paper notebook requires additional work later on in digitizing the notes taken. This adds an extra level to the pre-analysis work and slows down the write-up process.

In this case, the researcher's SMDs were most appropriate for the three concerns to be addressed (Table 2). An iPhone 3GS was used to record the interviews. The iPad allowed for memoing and the collection of non-standard data such as body language and eye contact. The use of both technologies was underpinned by software utilizing cloud technology (Dropbox) that permitted digital writing (Evernote) and automatic synchronization on multiple devices.

Evernote and Dropbox are tools specifically developed for online cloud synchronization of content. Evernote is a note-taking tool that allows for the storage of traditional and multimedia content. It has been developed for flexible content that can take many shapes including written notes, pictures, videos, and sound recordings. Its usefulness within this research was this flexible storage of multiple types of data which could then be tagged and stored for convenient searching at a later date. The vast array of note-taking abilities made Evernote the perfect choice in the use of memoing. Dropbox is an online storage tool which allows for the storage of files and documents in what is referred to as "cloud storage". Cloud storage refers to a network of virtual servers generally hosted by third parties, allowing access to and from multiple devices at any given time. The audio recordings were automatically stored in the Dropbox to examine at a later date. This alleviated the problem of relying too heavily on the physical device's storage capacity.

Table 2. Concerns, Technology, and Justification for Use

Concern	Technology	Justification
1. Which technology will allow for maximum interaction with the respondent with minimal technological disruptions?	iPhone 3GS iPad (1st generation)	Ease of use and familiarity with the device's software and interface allowed the interviewer to focus less on the implementation of technology and more on the respondent. This allowed the building of trust and rapport crucial in interviews (Oppenheim 1998). The iPhone was set up and ready to record in less than 30 seconds. In the majority of cases this was done before the start of the interview.
2. How can duplication of effort and work be minimized?	iPad (1st generation) Evernote	All memoing notes were taken on an iPad. This allowed instant digitization of notes that were then automatically synched and backed up to an online Evernote account. The notes were taken during the interview.
3. How can data security and confidentiality be ensured?	iPhone 3GS iPad (1st generation) Dropbox	All audio and transcript files were stored under anonymous names and were automatically synched to the online Dropbox. This had two main advantages; first, it allowed for instant backup and second it enabled remote deletion if device was lost or stolen. The Dropbox synchronization software was set up and initialized before the commencement of the interview to minimize disruption.

Device Use and Performance

As discussed earlier, time is critical during an in-depth interview, and good first impressions are important to elicit good quality responses, and hence, rich data. As Oppenheim (1998) clearly states, the interviewer is often frantically busy at the start of the interview, but must be careful not to show this to the participant. Oppenheim (1998) concludes that researchers spend an inordinate amount of time and energy setting up recording equipment and checking that all the necessary technology is working. This time and energy would be better spent in welcoming and thanking the respondent for his/her time. The iPhone and iPad can play a part in minimizing the problems mentioned by Oppenheim (1998), allowing the interviewer to spend more time with the respondent and less time on implementing the technology.

When traditional data collection instruments such as Dictaphones and microphones are used during interviews the respondents are faced with technology they are likely to understand and recognize. Most respondents will be familiar with this protocol and are likely to give their consent when asked "do you mind if I tape this interview?" (Oppenheim, 1998). This familiarization, in turn, leads to a certain level of comfort with this traditionally used technology as its role is clear in the interview.

However, when using SMDs, this role may not be as clear to the participants. During the project, the researcher utilized two SMDs (iPhone and iPad) across seven in-depth interviews. As previously noted, there were three primary concerns that the technology had to address. In addition to these concerns, the respondents had issues which required explanation and reassurance. These concerns have emerged from the interviews undertaken so far and can be categorized as follows:

- Perceptions of formality/informality
- Curiosity
- Ethical issues
- Confidentiality

Perceptions of Formality/Informality and Curiosity

Oppenheim (1998) states that utilizing a Dictaphone and microphone in less-developed countries may require more explanation around the purposes of the research so that various suspicions may be allayed. We can draw a comparison with this kind of thinking to academics who encounter SMDs within developed countries. By using SMDs as a data-collection tool, the researcher needs to facilitate the altering perceptions of formality/informality and allay concerns and issues before the interviews can begin. It may be that some of these concerns arise from a lack of computer literacy and familiarity with the devices' functionality. The use of these devices did have a novelty value for some academics in our study, who seemed a bit bemused with using an iPhone as a data-collection device. Discussing the use of these tools became a good way of breaking the ice with the participants at the beginning of the interviews, enabling a rapport to be built.

However, while the device played a useful role in the development of rapport, it did still have some negative connotations with regards to academic perceptions. The iPhone has as of yet to be perceived as a 'serious' research tool, as it is still primarily associated with social uses. The researcher was concerned about the effect this might have on the quality of the research and data collection. However, the results did not justify these concerns.

Ethical Issues and Confidentiality

This perception also manifested itself in issues of confidentiality and ethics. Two participants did express concerns about confidentiality and whether sensitive data such as theirs would be appropriate or safe on "just a mobile phone". It is imperative for this very reason to build trust at the start of the interview and expressly reinforce the nature of the research. Also the researcher should make clear that the device is being used for recording and not transmitting, and that procedures for safeguarding data are in place. For example, data can be protected by name changes and can be deleted remotely if the device is lost or stolen. For additional security, both the Dropbox and Evernote accounts are password protected and encrypted.

Sample Evaluation and Issues Encountered

The use of the iPhone and iPad was planned as part of the data collection process and they quickly became valuable tools which enabled the researcher to store and manipulate the data more effectively. The use of Evernote and Dropbox alongside the devices vastly reduced back-up and confidentiality issues. While these issues were minimized, problems were encountered with the Evernote software on a few occasions where synchronization with the Evernote server proved problematic.

After one interview had been completed, the memoing notes were written and saved on the iPad. Most of the written notes were written offline when there was no viable internet (Wi-Fi) connection. This was not a problem on most occasions because synchronization commenced when valid Wi-Fi connections became available. However, on one occasion there was a problem with synchronizing the memo notes with the Evernote server. On every attempted synch, a server error occurred and the software asked for permission to delete any new notes. This would have deleted any interviews completed over the last two to three days, resulting in the loss of important data. In order to circumvent this problem the notes were copied into another application on the iPad. Doing so, unfortunately, meant the loss of any formatting that had been used during the creation of the notes. While there are ways to work around the synching issue, it is important to be aware this may happen if the Evernote server is down, and alternatives should always be considered. Ideally, all notes should be completed in an online environment so there is a continuous server connection – thereby eradicating the problem – but this is not possible in every scenario.

The biggest challenge that the researcher faced while utilizing the SMDs within this context was the academic perception of how secure the conversations and notes were in the online environment. Many academics perceived the internet as an unsecure domain and were keen to know if Dropbox and

Evernote could store confidential data safely. The respondents were reassured that Dropbox and Evernote utilize technology used by both banks and the military to secure their data. However, doubts still lingered and this may always be a problem for many academics.

In sum, the iPad and the iPhone 3GS have shown to be invaluable tools in the research collection process, and in this example the collection of data was easy and efficient. The SMDs proved to be progressive tools that could be used in multiple ways. The next example appraises the use of SMDs (both the iPhone and iPad again) in the context of design-based research which investigated the potential of mobile phones in maintaining a successful learning environment for English as a Foreign Language (EFL).

Example 3: Classrooms in our Pockets, Context at our Fingertips: The Need for a Contextualized EFL Education

Research Aim and Approach

The focus of this study was to develop theory-based design principles relevant to the integration of mobile technology. The use of mobile phones in particular could enhance collaborative language learning, vocabulary acquisition, context-awareness, and above all, capitalize on out-of-class language learning opportunities. To achieve this, a design-based research study was conducted with a group of university students from two EFL classes over a 16-week semester. Implications for research into mobile learning were inspired by characteristics of design-based research (Wang & Hannafin, 2005). The perceptions, feedback, and experiences of the students regarding the use of a social networking mobile medium (Facebook) to maintain a beneficial collaborative learning environment was investigated through observations, stimulated recall, and focus group interviews.

Given that mobile learning does not rely on a specific learning theory, (Naismith, Lonsdale, Vavoula, & Sharples, 2004; O'Malley et al., 2003), there is an urgent need for a theoretically-established paradigm for mobile learning that can be employed for mobile *language* learning. As a result, a qualitative, design-based approach was proposed, and current design principles of mobile learning (Herrington, Herrington, & Mantei, 2009) were examined and refined. This was done to establish and account for theoretical implications for mobile language learning. The original proposal involved reflections and feedback of EFL learners in the design.

The other purpose of this study was to investigate the potential of mobile phones in maintaining a successful learning environment, in particular, exploring whether mobile phones may assist language learners in establishing a collaborative mobile medium. This approach takes advantage of the students' familiarity with the use of mobile phones on one hand and social networking environments such as Facebook on the other. The integration of mobile phone technologies into higher education holds both opportunities and risks for the quality of mobile learning (Kolb, 2008; Kukulska-Hulme, 2005). As a result, it is essential that a better understanding is gained of learners' perceptions and attitudes towards the implementation of mobile phones in language learning. It is also important to ascertain to what extent language learners are prepared to invest in the rich learning opportunities offered by mobile phones. Such an understanding may also elucidate potential pathways for teachers, researchers, and mobile application designers to provide instructional conditions that may engender change towards more beneficial mobile learning practices.

Mobile Devices Used and Reasons for Use

SMDs, i.e. an iPhone and an iPad, were used as data collection tools. The iPhone's uses included:

- Digital recorder: to record focus group interviews,
- Observation tool: to observe students' threads and interaction through Facebook and to respond to these threads when and where needed,

- Attendance and students' follow-up: to take students' attendance and make a profile for each student. This was also used to communicate with students, either individually or in groups, via SMS or email, report students' progress over the semester, and to take general notes regarding students. This was conducted via the Attendance app.
- Notes: notes were taken during classes in a draft format.

Alternatively the iPad was used to observe students' Facebook interactions via the Friendly Facebook for iPad App. Important segments of Facebook interaction and Blackboard discussion were screen-captured for later data analysis. Captured screen shots were later shown to students during recall sessions as stimulative tools. The other use of the iPad was to synchronize notes that were taken on the iPhone and rewrite them in further detail.

There are several reasons underpinning the use of mobile devices as data collection tools in this study. First, it was initially hypothesized that students would be more enthusiastic in using their mobile phones for learning if they were aware of their teacher using his own device frequently. Therefore, the teacher (in this case also the researcher) intended to inform his students indirectly of the potential of their mobile phones as valuable learning tools. Second, the researcher found it easier to use his iPhone and iPad for in-class activities without the need for paper notes or additional devices such as a digital recorder or even a laptop. Additionally, both the iPhone and the iPad are user-friendly SMDs that can support researchers with a wide variety of applications and have huge potential for research and data collection (Table 3). Also, synchronization between the two devices proved fast and effective. Finally, the availability of wireless Internet networks and a good 3G network at all research sites encouraged the use of mobile devices.

Device Use and Performance

Focus group interviews

Ten students chosen at random (five from each class) participated in recorded, one-hour focus group interviews. Students were asked to form a circle and the iPhone was placed on a desk in the center. During the interview, the researcher often checked that the SMD was recording, which became distracting for the students. After the interview, the researcher thanked the students and retrieved the iPhone to save the audio file which was later downloaded to the laptop. Unfortunately the voice quality of the interviews was not high and hence the researcher was forced to employ the use of digital amplifying software when transcribing the interviews.

In-class activities

The Attendance application was used to take and keep attendance records and to track students' progress during the semester. Moreover, the application was used to email or SMS individual students or the entire group, especially those who were missing on a given day. Also, each student profile had a field for storing additional information. Stored reports and progress information were saved in CSV-spreadsheet format for further analysis.

The iPhone was also used to monitor learning activities via Mobile Blackboard. Students were asked to use their mobile phones to respond to class announcements, participate via the discussion board, and complete short quizzes.

Table 3: Applications Used in the Study

Device	Application	Description
iPhone 3GS	Voice Memos	A standard iPhone application that is used to make quick, short and long recordings. After the recording is completed, files are automatically saved as Voice Memos and filed by the dates they were recorded. Files can be uploaded to a computer via iTunes.
	Notes	A standard iPhone application that allows the user to type short text documents and save them as list notes. The main screen of the application shows when each note was saved and/or edited. Notes can be synchronized to another device or email accounts i.e. Gmail or Yahoo.
	Attendance	An application that allows taking and keeping of daily attendance records for each class/group and each individual student. Through Attendance, a teacher can email an entire group, email/SMS students who were missing on a given day, and send records to individual students. Records can be saved and/or emailed in a CSV spreadsheet format.
	Facebook	A mobile application used to access Facebook. Added to standard features of the Facebook website e.g. chatting, messaging, etc, The application supports instant photo capture and uploading via the iPhone camera, and the ability to find and share locations.
	Bb Mobile Learn	An application that allows mobile access of the online teaching and learning platform Blackboard. Students can check announcements and grades and assignments, email their classmates and instructors, and add discussion board comments and blog posts.
iPad (1st Generation)	Friendly Facebook	A Facebook application specially designed for the iPad. It mainly provides full screen display of photos and feeds, easy photo downloads, customizable colors and fonts, and easy switching between multiple Facebook accounts.
	Pages	A word processor application designed for different platforms including the iPad. A user can create, edit, and share documents either by typing on the multi-touch iPad screen or via a wireless keyboard.
	Bb Mobile Learn	See above

Note-taking

When different phenomena were observed during in-class activities, the researcher found it easier to take notes via his iPhone. However, although the iPhone is an effective and immediate data collection tool, this strategy proved, at times, to be confusing and distracting for the students. Notes taken by the iPhone were usually short and symbolic. These notes were later synchronized to the iPad and more detailed and organized notes were developed.

Facebook observation

Student-to-student and teacher-to-student interactions were monitored, and the numbers and types of comments recorded. The researcher frequently monitored students' Facebook interactions using the iPhone, responding and commenting where relevant or useful. Notes were sometimes taken by the iPhone after observing students' Facebook interaction. Facebook and Blackboard observation sessions using the iPad were conducted at specific times, usually after classes, in order to capture important segments and to save text-based interactions in document format (using the Pages application).

Stimulated recall sessions

Screen-captured Facebook and Blackboard discussions were shown as stimuli to students participating in recall sessions. Sessions took place in-class using the iPad and feedback was recorded with the iPhone.

Sample Evaluation and Issues Encountered

Overall, both the iPhone and the iPad proved to be advantageous data collection tools, although the researcher was initially skeptical about the benefits of working on a SMD in this research project. The iPhone was limited as a data collection tool by its insufficient battery life and low sound quality of recorded files. Therefore, it is recommended that a suitably synchronizable digital recorder with high voice recording quality could be used and hence would not need to be as close to the interviewees, thereby reducing distractions to both the students and researcher. The iPhone and iPad were both limited by their inability to upload files onto other devices without using iTunes as intermediary software. In this study, screen-captured shots along with recorded files were downloaded to a laptop via iTunes and kept in a secured file with anonymous file codes. This was a time consuming process, especially with large size files.

However, future development of SMDs like the iPhone and iPad is likely to see more user-friendly synchronization, longer battery life, and specially-designed applications for data collection and analysis. Adding higher-quality voice capturing and integration of cameras will make these tools more powerful and suitable for a wider range of tasks.

The examples described and evaluated here presented the use of SMDs in a variety of contexts and for different uses. The concluding section of this paper draws together the lessons learnt from these examples and weave in discussions recorded at the LWF conference in January 2011. The discussion addresses technological implications, applications being used, inherent ethical issues, and future use of SMDs in qualitative research settings.

Reflections on Social Mobile Devices in Educational Research

Technological Considerations

The examples in this paper feature primarily the use of Apple technology in the form of iPhones (3GS) and first generation iPads. This does not imply that other SMDs which use different platforms will not be as good, or in some situations perhaps superior, for data collection. However, the reader should be

reminded that this article is limited by its focus upon these devices. It is hoped that ideas, issues, and guidance generated from the three examples might help inform use of the SMDs in different settings and might also be transferable to other platforms and different devices.

The use of an iPhone 3GS in the ethnography example was initially intended only as a temporary solution. However, it soon became an invaluable tool. In this setting, its use was enabled by the positive responses engendered from the students being observed. For the researcher the phone was easy to use while several functions could be accessed in one device. The iPhone also provided geo-tagged images and was synched with the MacBook Pro laptop and its local software to read, edit, and analyze the data. This had not been the case with previous devices and Windows machines during earlier field trips. There was a lack of Internet access at the rural location and the iPhone, although occasionally losing its signal, eased this by enabling outside communication, research, and support. However, using the iPhone without the Apple IOS4 update (not released at that time) meant it was not possible to run applications simultaneously. Furthermore, poor visibility in sunlight and wet weather did reduce its usefulness.

In the interviewing example, the iPhone and iPad became valuable tools, enabling the researcher to store and manipulate the data more effectively via the use of Evernote and Dropbox, and thereby reducing backup and confidentiality issues. Nevertheless, software is not infallible and further back up plans for data storage might be needed. Similarly, hardware is not flawless and also might not yet be sensitive enough (poor sound quality) for data collection or may need a backup in case of problems. It is more difficult to re-run interviews or focus groups than use an additional audio recorder as a backup.

The design-based research example highlighted the problems inherent in synching between different platforms and it is hoped that in time these issues will be addressed. Using different systems is likely to result in some technological differences and synchronization problems. However, forward planning and testing will alleviate some of these issues. An advantage of using other platforms could be that open source applications and software can be utilized if needed. This can, however, be messy and difficult to manage for the less computer-literate as file types can cause reading and uploading issues. Using Apple to Apple does reduce these conflicts considerably as the software is designed to work together and synching is easy. There are no file conflicts and the file size from iPhone media is smaller due to lower quality images and audio. This may prove to be a limiting factor for some research settings; however, this largely depends on appropriation for use and what technology is accessible. Some researchers may prefer Windows or other platforms for different reasons, and much of the guidance in this paper can be translated to use on these different platforms.

Applications

The applications used on the iPhone and iPad within the author's examples are represented in Figures 4 and 5 below. A reoccurring theme at LWF 2011 was the potential of apps for education. Many of the delegates received an iPad as part of their registration package and during the primary author's presentation they downloaded suggested apps and discussed which apps they found useful. The most useful at that time (and for interviewing) was software that enabled real-time transcription of an audio recording taking place (in this case the presentation). The delegates admitted it was not perfect, but it worked sufficiently to reduce time typing up notes later, and the transcription had the sound file attached for detailed listening if needed. Other apps used included Audio Note, Smart Recorder, Dragon Dictation, and Pear Note (the latter integrates a variety of media with the notes, including video). These have important affordances for the recording of interviews, focus groups, and memoing in real time.

Figure 4: iPhone Apps Used for Data Collection by the Authors

Figure 5: iPad Apps Used for Data Collection by the Authors

The native apps located on the iPhone are quite versatile and were used in the examples described, but there are also a variety of more specialized applications that could be used to further enhance the iPhone's capability as a research tool. Some might be used to aid ethnography (EthOS) and structured observations while others allow users to create questionnaires or surveys (Surveyor), which can be managed through a web provider and collected in-situ. There is a variety of voice recording applications, some of which offer (for a fee) a transcription service; this could vastly reduce the time spent transcribing focus group or interview data. In the interviewing example, the devices' data collection functions were underpinned by software utilizing cloud technology (Dropbox) and digital note taking (Evernote). They enabled automatic synchronization on multiple secure devices for back up and remote deletion for security, meaning that the data on the device can be deleted quickly, thereby reducing further security risks. Evernote (also present as an iPhone app) allows the collection of different types of media, making it ideal for a variety of research settings.

Geolocation technology was a key tool for the ethnography, where Pin Trip was used to track the students' activities in time and space. However, this app does not automatically record points, whereas Endomondo Sports Tracker tracks continuously and also monitors speed. iPhoto enabled the use of Google Earth in geo-tagging of the images and also allowed further tags and notes to be added. A linked Technology Enhanced Learning (TEL) project has used Google Earth with the MIT SIMILE tools to produce excellent simulations and data manipulation programs. This could be applied to research and analysis.

Ethics Considerations

Recording data with SMDs is a sensitive issue which questions privacy in both public and classroom spaces. There is a growing body of literature focusing upon the ethical issues inherent in using SMDs for learning in educational settings (Lally, et al., 2011; Wishart, 2009). The LWF 2011 discussions were useful for exploring the issues surrounding the use of these tools for research. Of main concern is recording in public spaces and anywhere else where controlling what you might record is more difficult, especially in regard to the capture of visual data. One delegate suggested putting the camera in a less obvious place than the head (in the case of the head-mounted camera); however, this might be conceived as a more covert strategy that could be considered deceptive. As a researcher recording for research purposes in the public domain, it is unrealistic to make all passers-by aware of the reasons behind and for your research. Furthermore, many of the passers-by might also have and use this technology, resulting in a scenario of 'who is recording who and for what purpose?' (Reading, 2009). The ability of these devices to enable everyone to be a researcher is both an attractive and concerning idea if those individuals do not respect basic ethical principles. In most cases we rely on the good etiquette of others using these devices and can reinforce this by practicing this in our own research. Examples of such practice includes avoiding recording faces and conversations outside our research interest, blocking out passers-by in our data where needed, and obscuring house and road names and car registrations. Finally, being open and honest with passers-by as to your intentions and the future use of the data, if asked, is important as well.

A concern for many participants is the safety of this kind of data on this kind of device (SMD). Being both digital and with data possibly kept or shared online, they may fear for the data's safety if the device was lost or stolen. Therefore, it is essential to back up, download, or upload to the cloud and then wipe and/or encrypt the data on the device. This has the additional purpose of ensuring against any data loss that might arise due to a myriad of possible technological mishaps.

Building trust with your participants when using SMDs for qualitative research arose in each example and seems key to successful data collection. Clear instructions regarding what the devices are being used for and when they are being used is essential. There needs to be careful consideration and explanation to the participants of the strategies being employed to ensure confidentiality and security of data. Further to this, detailed ethical approval with informed consent from participants should be standard. Offering data for shared viewing and allowing opportunities for participants to choose if they want time off from being recorded is also helpful in building trust. Designating the tool a research device and disabling its communicative features may also be good practice, depending on the setting. This might also reduce the

distractive and novel nature of the device. In addition, the way in which SMDs are viewed might change in time through further technological developments. Added to this, their continued use in research might help them become accepted as standard research tools.

It is important to consider existing ethical frameworks and processes when designing research involving SMDs, but also to carefully address how this existing guidance might be translated and extended in order to manage the wide variety of informal, immersive, and mobile activities. For further guidance, see Lally et al. (2011), who strongly advocate an iterative, incremental model of ethical design when using new emerging technologies such as SMDs.

The Future of Smartphones in Qualitative Research Settings

Overall, the SMDs discussed (iPhone 3GS and first-generation iPad) were valuable tools whose underpinning technology will continue to develop and perhaps offer further affordances. Indeed, the iPad 2 had just been launched at the time of writing. Features such as longer battery life and built-in cameras might bring about future opportunities for research, teaching, and learning. Further to this, the prolific development of apps is allowing more opportunities to unitize these devices in research settings. Other SMDs are following fast and the researcher has an ever-wider choice to suit their skills and needs.

In the case of ethnographic research, specific apps are being developed (EthOS). The integrated use of geo-referenced data is invaluable for studies on mobility, and the unique ability of mobile devices to stay 'in-world' with the participants is the key attraction of using this technology for research. With interview-based approaches, microphones have been developed for previous iPod models and may work or are soon developed to work with iPhones (Bluemic). There are also lenses that may be attached to the iPhone to increase image resolution.

Other smartphone platforms are likely to experience similar growth in apps and accessories, and as such their use in research will also prove valuable. SMDs' 'connectedness' to larger networks gives researchers the ability to access, and examine our data in wider contexts. Furthermore, technological development will enable new opportunities, including capturing data outside our field of interest by using a 360-degree camera lens. This would allow us to attend events that took place around the scene of interest instead of being excluded by our topic of focus at that time.

Therefore, it seems that SMDs offer unique opportunities for research, and it is likely we will see further innovative uses of the iPhone and other smartphones both now (Ter Hofte, 2007) and in the near future. Their portability and multi-functionality lessens the need for several, often-larger devices that have a single role. Consequently, in settings where multiple data sets are being recorded, albeit not simultaneously, the iPhone and other smartphones could be invaluable for future social qualitative research. As researchers we must carefully consider issues of privacy and surveillance when undertaking research with SMDs. As a result, there is a need to explore more deeply the difference these tools make, especially as compared to traditional methods and tools, if they are to progress and be appropriated in other disciplines in a suitability sensitive but successful manner.

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References

Ahmad, F. (2006). *Modern traditions? British Muslim women, higher education and identities.* Unpublished doctoral dissertation, University of Bristol, Bristol, UK.

Beddall-Hill, N. L. (2011, January). *Using an iPhone 3GS in mobile ethnography: A rich and novel tool for field research*. Paper presented at the Learning Without Frontiers Conference, London, UK.

Beddall-Hill, N. L. (2010). Witnessing learning in mobile settings using a head mounted camera. In E. Brown (Ed.), *Education in the wild: Contextual and location-based mobile learning in action. A report from the STELLAR Alpine Rendez-Vous workshop series (pp.39-42).* University of Nottingham: Learning Sciences Research Institute (LSRI).

Beddall-Hill, N. L., & Raper, J. F. (2010). Mobile devices as 'boundary objects' on field trips. *Journal of the Research Center for Educational Technology. 6*(1), 28-4. Retrieved from http://www.rcetj.org/index.php/rcetj/article/view/84

Brown, K. M., Dilley, R., & Marshall, K. (2009). Using a head-mounted video camera to understand social worlds and experiences, *Sociological Research Online, 13*(6), 1. Retrieved from http://www.socresonline.org.uk/13/6/1.html

Coutas, P. (2010). *Good looking with technology: The iPhone and ethnographic research* [PowerPoint slides]. Retrieved from http://www.slideshare.net/pcoutas/good-looking-with-technology-the-iPhone-and-ethnographic-research

Dicks, B., Soyinka, B., & Coffey, A. (2006). Multimodal ethnography. *Qualitative Research 6*(1), 77–96.

Flick, U. (2006). *An introduction to qualitative research* (3rd ed.). London: Sage Publications.

Geltz, B. R., Berlier, J. A., & McCollum, J. M. (2010). Using the iPhone and iPod Touch for remote sensor control and data acquisition. *In Proceedings of IEEE SoutheastCon 2010* (pp. 9-12). Concord, NC. doi: 10.1109/SECON.2010.5453933

Hamou, A., Guy, S., Lewden, B., Bilyea, A., Gwadry-Sridhar, F., & Bauer, M. (2010, July). *Data collection with iPhone web apps efficiently collecting patient data using mobile devices*. Paper presented at the e-Health Networking Applications and Services (Healthcom), 12th IEEE International Conference, Lyon, France.

Herrington, A., Herrington, J., & Mantei, J. (2009). Design principles for mobile learning. In J. Herrington, A. Herrington, J. Mantei, I. W. Olney, & B. Ferry, (Eds.), *New technologies, new pedagogies: Mobile learning in higher education* (pp. 129-138). Wollongong, Australia: University of Wollongong.

Kolb, L. (2008). *Toys to tools: Connecting student cell phones to education.* Eugene, OR: International Society for Technology in Education (ISTE).

Kukulska-Hulme, A., & Traxler, J. (Eds.). (2005). *Mobile Learning: A handbook for educators and trainers*. London: Routledge.

Kukulska-Hulme, A. (2005). Introduction. In A. Kukulska-Hulme & J. Traxler (Eds.). *Mobile learning: A handbook for educators and trainers* (pp. 1-6). Wiltshire, UK: The Cromwell Press.

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *Amercian Educational Research Journal, 32*(3), 465-491.

Lally, V., Sharples, M., Bertram, N., Masters, S., Norton, B., & Tracy, F. (under review). Researching the ethical dimensions of mobile, ubiquitous, and immersive technology enhanced learning (MUITEL) in informal settings: A thematic review and dialogue. (FUNDED by EPSRC/ESRC RES-139-25-0402) Submitted to *Interactive Learning Environments* (Special Issue).

Leavey, P., & Hesse-Biber, S. N. (2004). *Approaches to qualitative research.* New York: Oxford University Press.

Lewis, J., & Ritchie, J. (2003*). Qualitative research practice*. London: SAGE.

Luckin, R. (2008). The learner centric ecology of resources: A framework for using technology to scaffold learning. *Computers and Education 50*(2), 449-462.

Murthy, D. (2008). Digital ethnography: An examination of the use of new technologies for social research, *Sociology, 42*(5), 837-855.

Naismith, L., Lonsdale, P., Vavoula, G., & Sharples, M. (2004). *Literature review in mobile technologies and learning.* A Report for NESTA Futurelab. Retrieved from http://archive.futurelab.org.uk/resources/documents/lit_reviews/Mobile_Review.pdf

Nieto, S. (1999). *The light in their eyes: Creating multicultural learning communities.* Stoke on Trent, UK: Trentham Books.

O'Malley, C., Vavoula, G., Glew, J. P., Taylor, J., Sharples, M., & Lefrere, P. (2003). *Guidelines for learning/teaching/tutoring in a mobile environment.* Retrieved from http://www.mobilearn.org/download/results/guidelines.pdf

Oppenheim, A. N. (1998). *Questionnaire design, interviewing and attitude measurement*. London, UK: Pinter Pub Ltd.

Reading, A. (2009) Mobile witnessing: Ethics and the camera phone in the 'War on Terror', *Globalizations, 6*(1), 61-76. Retrieved from http://www.informaworld.com/smpp/content~db=all~content=a909880125~frm=titlelink

Ricketts-Hein, J., Evans, J., & Jones, P. (2008). Mobile methodologies: Theory, technology and practice. *Geography Compass, 2*(5), 1266-1285.

Roschelle, J. (2003). Keynote paper: Unlocking the learning value of wireless mobile devices. *Journal of Computer Assisted Learning, 19*(3), 260-272.

Ter Hofte, G. H. (2007, October) *What's that hot thing in my pocket? SocioXensor, a smartphone data collector*. Paper Presented at e-Social Science 2007, the Third International Conference on e-Social Science, Ann Arbor, MI.

Traxler, J. (2011, January). Discussions recorded during a conference paper presentation by N. L. Beddall-Hill, *Using an iPhone 3GS in mobile ethnography: A rich and novel tool for field research.* London, UK: Learning Without Frontiers Conference.

Urry, J. (2007) *Mobilities.* Cambridge, UK: Polity Press.

Urry, J., & Buscher, M. (2009). Mobile methods and the empirical. *European Journal of Social Theory, 12,* 99-117.

van 't Hooft, M. (2007). Researching informal and mobile learning: Leveraging the right resources. In G. Vavoula, A. Kukulska-Hulme, & N. Pachler (Eds.), *Proceedings of the WLE Workshop Research Methods in Informal and Mobile Learning: How to Get the Data We Really Want*, 73-77. WLE Centre, Institute of Education, London, UK. Retrieved from http://www.wlecentre.ac.uk/cms/files/events/book.pdf

Wang, F., & Hannafin, M. J. (2005). Design-based research and technology-enhanced learning environments. *Educational Technology Research and Development, 53*(4), 5-23.

Wishart, J. M. (2009). Ethical considerations in implementing mobile learning in the workplace. *International Journal of Mobile and Blended Learning*, *1*(2), 76-92.