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Researching the ethical dimensions of mobile, ubiquitous and immersive technology enhanced learning (MUITEL): a thematic review and dialogue

Vic Lally [a], Mike Sharples [b], Frances Tracy [c], Neil Bertram [d] & Sherriden Masters [e]

[a] School of Education, University of Glasgow, St Andrews Building, 11 Eldon Street, Glasgow, G3 6NH, UK

[b] School of Education, University of Nottingham, Jubilee Campus, Wollaton Road, Nottingham, NG8 1BB, UK

[c] Faculty of Education, Community and Leisure, Liverpool John Moores University, Barkhill Road, Liverpool, L17 6BD, UK

[d] MRC Social & Public Health Sciences Unit, University of Glasgow, 4 Lilybank Gardens, Glasgow, G12 8RZ, UK

[e] Learning Sciences Research Institute, University of Nottingham, B3 Exchange Building, Jubilee Campus, Nottingham, NG8 1BB, UK

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Researching the ethical dimensions of mobile, ubiquitous and immersive technology enhanced learning (MUITEL): a thematic review and dialogue

Vic Lally[a]*, Mike Sharples[b], Frances Tracy[c], Neil Bertram[d] and Sherriden Masters[e]

[a]*School of Education, University of Glasgow, St Andrews Building, 11 Eldon Street, Glasgow, G3 6NH, UK;* [b]*School of Education, University of Nottingham, Jubilee Campus, Wollaton Road, Nottingham, NG8 1BB, UK;* [c]*Faculty of Education, Community and Leisure, Liverpool John Moores University, Barkhill Road, Liverpool, L17 6BD, UK;* [d]*MRC Social & Public Health Sciences Unit, University of Glasgow, 4 Lilybank Gardens, Glasgow, G12 8RZ, UK;* [e]*Learning Sciences Research Institute, University of Nottingham, B3 Exchange Building, Jubilee Campus, Nottingham, NG8 1BB, UK*

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In this article, we examine the ethical dimensions of researching the mobile, ubiquitous and immersive technology enhanced learning (MUITEL), with a particular focus on learning in informal settings. We begin with an analysis of the interactions between mobile, ubiquitous and immersive technologies and the wider context of the digital economy. In this analysis, we identify social, economic and educational developments that blur boundaries: between the individual and the consumer, between the formal and the informal, between education and other forms of learning. This leads to a complex array of possibilities for learning designs, and an equally complex array of ethical dimensions and challenges. We then examine the recent literature on the ethical dimensions of TEL research, and identify key trends, ethical dilemmas and issues for researchers investigating MUITEL in informal educational settings. We then present a summary of research dialogue between the authors (as TEL researchers) to illuminate these MUITEL research challenges, indicating new trends in ethical procedure that may offer inspiration for other researchers. We conclude with an outline, derived from the foregoing analysis, of ways in which ethical guidelines and processes can be developed by researchers – through interacting with participants and other professionals. We conclude that ethical issues need to remain as open questions and be revisited as part of research practices. Because technologies and relationships develop, reassessments will always be required in the light of new understandings. We hope this analysis will motivate and support continued reflection and discussion about how to conduct ethically committed MUITEL research.

Keywords: mobile; ubiquitous; immersive; technology enhanced learning; research ethics

*Corresponding author. Email: vic@viclally.eu

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Introduction

This article addresses the ethical challenges that may arise when researchers investigate mobile, ubiquitous and immersive technology enhanced learning (MUITEL). It has a particular concern with MUITEL in informal learning settings, because our recent research has focused on these. However, this article examines ethical challenges across the full range of contexts. MUITEL is made possible, and is significant, because of two major developments. The first is the substantial usage and availability among young people of mobile phones and related networked devices, with their associated networked systems. Secondly, the mainstreaming of 'immersive 3D' worlds (actually simulations of 3D environments on a 2D screen, and therefore not truly immersive) is now engaging millions of 'virtual inhabitants' within the real economy in which US$450 million was spent in 2008 (Jacobson, Kim, Miao, Shen, & Chavez, 2010).

Only through interacting with participants, other professionals and researchers, and discussing ethical values, can MUITEL research in informal settings reach an ethically sound consensus. We suggest that ethical issues need to remain open questions and be revisited as part of research practices. Because technologies and relationships develop, reassessments will always be required in the light of new understandings.

The principal aims of this article are:

- to locate MUITEL, within the wider cultural and economic context of the digital economy;
- to explore the cultural and economic shifts giving rise to MUITEL, the nature of young people's engagement with it outside the classroom, and the ethical challenges that this presents for both educators and researchers;
- to examine the recent literature on the ethical dimensions of TEL research, with a view to identifying key trends, ethical dilemmas and issues for researchers investigating MUITEL including informal educational settings;
- to present a dialogue between researchers about the ethical challenges of MUITEL research, and the need for a participatory and iterative approach to ethical conduct;
- to inspire further debate on how to conduct ethically committed MUITEL research among the TEL research and practitioner communities.

MUITEL and 'shifts' in the digital economy

We suggest that developments in mobile and networked technologies change young people's cultural landscape, allowing them to communicate, socialise and collaborate on their personal projects in new ways. Furthermore, much of this activity is outside the formal education system (Sharples, Graber, Harrison, & Logan, 2009). Additionally, people of all ages are engaging with their personal technologies to form new 'ecologies' of learning, in the home, at the workplace and outdoors (Looi, 2001), thus enhancing and re-enforcing the cultural shifts experienced by young people.

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MUITEL: ethical challenges for educators and researchers

The challenges faced by educators are complex as they attempt to integrate MUITEL into their learning designs, in order to enhance educational processes and outcomes. By better understanding of the possibilities and limitations of these technologies in educational settings, we may use them more effectively to enhance learning in sustainable, exciting and robust ways. MUITEL reveals a new learning landscape, merging the formal and the informal. It also presents researchers and teachers with new ethical dimensions that need to be elaborated and understood. In our exploration of the ethics of research into MUITEL in this article, we re-examine existing ethical frameworks and codes of practice, and reflect more generally on the role and position of ethics in research. Ethics can be related back to the Aristotelian notion of 'phronesis', as ethically informed practical reasoning (Hughes, 2001). Phronesis is one of three principal intellectual virtues proposed by Aristotle (2000), the other two being 'episteme' and 'techne'. Episteme is classed as scientific knowledge of eternal and universal truths (Aristotle, 2000, p. 105). In contrast, techne is translated as art, craft or skill required to pursue a particular end (Wiliam, 2008). Phronesis transcends both episteme and techne as it concerns the problem of acting rationally in situations that are contingent and variable (Wiliam, 2008) – exactly the kinds of situations created by MUITEL. Elliott proposes that 'ethically committed action' (Elliott, 2006) requires 'disciplined conversation in which reasons for action are scrutinised, critiqued and modified'. Such conversations are, we suggest at the heart of phronesis. It is phronesis that underpins the argument for iterative and participatory research ethics that we develop in this article. Only through interacting with participants, other professionals and researchers, discussing ethical values, can MUITEL research achieve an ethically sound consensus. We argue that ethical issues need to remain open questions, and be revisited, as part of research practices.

Digital learning outside the classroom and the wider social implications

There is evidence that learning in informal and non-formal settings already constitutes the majority of educational interactions during a person's lifetime (Livingstone, 1999), so researching these new forms of interaction enabled by personal and social digital technologies (including MUITEL) is important for the development of the digital society (U.S. Department of Education, 2010) as well as for formal education. However, the educational value and safety of young people's digital engagement is a hotly contested area. Causes for concern about children's digital technology usage are largely drawn from child development and neuropsychology literatures (e.g. Byron, 2007; Dowd, Singer, & Wilson, 2006). Proponents, however, are largely drawing on sociological, critical and cultural studies (e.g. Buckingham, 2006; Gee, 2007; Prensky, 2005), arguing that young people have *already* successfully integrated digital engagement into their social routines.

While these unresolved debates continue in diverse literatures, the emergent social network technologies (Selwyn, 2008) have already extended the reach of online engagement by young people. This has implications for consumer choice and awareness, for safe and creative online social interaction, for the kinds of goods and services demanded, for the nature of education and hence for economic and social behaviour in the digital economy. In education, there is a growing divide between

children's use of social networking at home and the prohibition of Web 2 tools such as Facebook in the classroom (e.g. Sharples et al., 2009). A consequence is that children's online collaborative learning, along with their development of skills in web-based social networking, occur almost entirely outside the formal education system. Studying how children learn with MUITEL in classrooms, therefore, gives only a limited insight into education within the digital economy. There needs to be an examination of digital practices for learning outside of formal education (Sharples, 2002). Similarly, research into adult learning requires an analysis of the ways in which learning activities form a part of everyday life (Livingstone, 1999; Tough, 1979).

Within formal education current use of MUITEL has largely conformed to existing institutional practices, rather than applying its digital affordances to enhance creativity, collaboration and knowledge generation, or to radically reconstruct curriculum or assessment processes (e.g. Green & Hannon, 2007; Loveless, 2002; Luckin et al., 2008). Nevertheless, it is important to identify the consequences of researching and innovating MUITEL in formal settings.

One ethical implication of the personal networked society is that because knowledge, value, place and social interaction can now be so easily digitally manipulated (Lawson, 2004) companies can promote products to people wherever they may be, turning them into perpetual consumers. Personal digital technologies are linking informal and non-formal learning activities directly to economic activities and consumption. One example is the growth of edutainment, where companies market computer games as educational or self improvement products, promising 'quick, fun and effective activities designed to enhance performance in all areas by assisting whole brain integration'.[1] We argue that these 'digital cultural shifts' (Montgomery, 2007), have important implications for educational and social research. The study of people's personal use of digital technology for learning (Buckingham & Willett, 2009; Crook & Harrison, 2008; Sharples et al., 2009), and their engagement with digital technologies across formal and non-formal/informal settings for education (Vavoula, Sharples, Rudman, Lonsdale, & Meek, 2007), presents novel ethical issues.

Two technology enhanced learning-teaching and learning research programme (TEL-TLRP) projects – 'Inter-Life' and 'Personal Inquiry' – both funded by the EPSRC/ESRC in the UK (EPSRC/ESRC, 2011), have engaged in MUITEL research that bridges formal and non-formal/informal contexts. The projects are exploring with young people the intermediate ground that needs to be bridged when incorporating informal practices and use into designed educational contexts (Holland, Renold, Ross, & Hillman, 2008; Purdy & Walker, 2007) and supporting the continuation of learning across formal and informal settings (Vavoula et al., 2007). In doing so, the projects have to negotiate territory that by its very informal and collaborative nature requires ethical and educational processes to be negotiated and distributed amongst participants, rather than pre-determined by their institutional context. This participatory ethical approach has also been taken by the TEL-funded (EPSRC/ESRC, 2011) Ensemble project[2] in researching the use of semantic technologies to support case based learning (Tracy & Carmichael, 2010; Tscholl, Tracy, & Carmichael, 2009). The research dialogue in this article represents a discussion of the challenges faced by researchers in these three groups, and their approaches to conducting ethical TEL research. This discussion was influenced by our review of literature relating to MUITEL ethics that is presented as the next section of this article.

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Review of academic, guideline and informal ('grey') ethics literature

This thematic review summarises the ethical issues that are (i) directly relevant to MUITEL, (ii) specific to MUITEL research or (iii) include MUITEL. The review includes international ethical guidelines, formal peer-reviewed literature and emergent 'grey' literatures in this field. The ethical guidelines of 12 major international organisations were reviewed. General ethical frameworks were compared and contrasted, and areas of frequent concern investigated; specific ethical guidelines were also used to highlight common issues relating to the uses of informal MUITEL-based research. In all of the frameworks discussed, the process of their interpretation by institutional ethics review boards has not been systematically studied as far as we are aware. Apart from personal experience of such processes, we have no knowledge, from the research literature, of how this process is conducted, leaving a significant gap in understanding how research ethics are enacted in practice in this field.

Iterative and participatory research ethics

The Economic and Social Research Council's (ESRC, UK) 'Ethical Framework' acknowledges that qualitative social science research requires a different implementation approach to quantitative methods (ESRC, 2005, p. 21). Recognition within the document is given to 'iterative processes' of such research. In addition, a proportional approach to assessing risk is recommended (ESRC, 2005, p. 22).

Of particular significance is research that incorporates participants' social and affective engagement with digital technologies. It has been proposed (Bakardjieva & Feenberg, 2000) that researchers should move away from the 'granting approval' mode of ethics, towards treating the participants as partners in research (participatory research approaches). The unpredictability of context and activity in some MUITEL research means that researchers may not be able to predict what ethical issues they will encounter and how these relate to ethical guidelines. Traxler and Bridges (2004), for example, note that the nature of informed consent can raise issues in mobile learning, as the process is fluid, complex and dynamic. This may lead to situations, where participants are carrying out activities for which they have not given consent, or that could not have been represented simply to them (Traxler & Bridges, 2004). For example, students on a field trip with mobile devices may encounter physical danger (from walking around gazing at a screen), technological breakdown (from operating the technology in a field setting), social discrimination (from differing abilities to move around and perceive the world outdoors), or group conflict (from the need to coordinate activity outdoors). All these issues can be resolved through good educational practice, but the combination of personal technology and mobility inevitably produces issues that are not encountered in a typical classroom (Brown, 2010).

It is now common for participatory research approaches to be used in MUITEL research (e.g. Danielsson, Hedestig, Juslin, & Orre, 2004; Rogers, Connelly, Hazlewood, & Tedesco, 2010). Variability and adaptability are inherent in the very nature of participatory research and more expansive versions of participatory design. The need for participatory research to be adaptive to circumstances, to adopt

descriptive research methods, and to engage with participants in different ways at different times, makes it hard to predict potential issues in advance for the purposes of ethical review (Tracy & Carmichael, 2010). Brydon-Miller and Greenwood (2006, p. 119) describe action research projects as 'open-ended, collaborative, methodologically eclectic and without specific methods, processes, or final goals determined in advance', and suggest that this makes it hard to review, evaluate and approve or disapprove of the ethical aspects of research plans at early stages of project development. Hilsen (2006, p. 26) states that participatory action research cannot be reduced to an 'organisational recipe' ready to be implemented, but is rather an 'ever-present endeavour'. New understandings and transformations of practice can happen throughout the process. The development of an ethical framework is not driven by well-structured hypotheses, but rather by dilemmas and challenges that are explored with the aim of gaining a deeper understanding and improvement in practice (Muñoz & Jeris, 2005, p. 8). Elliott (2006, p. 178) suggests that participatory research methods should be chosen with the aim of helping practitioners to 'develop a reasoned capacity for action in the service of their educational values', bringing consideration of ethical issues into focus alongside other methodological deliberations.

Carmichael and Youdell (2007) propose a move away from 'permission seeking' to an iterative, fluid cycle of ethical practice. Bakardjieva and Feenberg (2000) also imply that there should be more 'stages, iteration and elaboration' when carrying out online research compared to offline. They also advocate the involvement of participants at the design stage, to allow methodological creativity while meeting ethical requirements. This was expanded upon by Bakardjieva, Feenberg, and Goldie (2004), who invoked two models of research ethics, as outlined by Freund (1969): the law model and the sociological model. The law model is defined by the trustee/client relationship, where the power lies with the researcher (trustee) to maintain and ensure the ethical concerns of the client. This contrasts with the sociological model, in which the parties form a 'professional collegium' and move towards the research goals in collaboration, with responsibilities and power being more equally distributed (Bakardjieva et al., 2004). The dynamic nature of MUITEL research outlined above leads to negotiation and re-negotiation as an essential process, with the involvement of participants, researchers and the ethical regulators as in the sociological model.

It is not always easy, however, for researchers to understand how to put this iterative and participatory approach to ethics into practice. Some of the key questions that need to be asked include: Who decides on the number and timing of iterations of research activity between ethical reviews? By what process are changes negotiated and agreed? Does the research stop while changes to ethical procedures are made?

Even if this type of negotiation and collaboration in research is feasible with adult participants, the power relationships of school-age children or minors and adults are asymmetric. Can a child ever be an equal collaborator to an adult? Perhaps a middle ground would be more suitable in which an asymmetry of power is acknowledged, but children's rights are respected, their views are sought, and their voices heard by researchers. The implications for the practices of ethical MUITEL research are discussed in the research dialogue, later in this article, where we share our experiences of trying to conduct ethical, participatory MUITEL research with young people in informal settings.

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Informed consent

The area of 'Informed Consent' is mentioned most frequently in the formal guidelines, and is of high importance for research with MUITEL. MUITEL research may utilise technologies and procedures that are novel, innovative and diverse. The deployment of immersive technology to study social interactions, and research into uses of mobile technology for learning in informal situations, can easily and quickly present ethical complexity. For example, issues such as deciding where anonymity would be appropriate, or how researchers should engage with bystanders and others not originally recruited to the study, are not always definitively clear at the outset of the research. This can complicate the process of gaining informed consent from the participants, and raises issues related to negotiated consent and negotiated privacy.

The professional associations reviewed for this article propose a written statement by the participant showing agreement to the researcher's propositions. The researcher explains to the participant as much as possible of what the research entails and, if both parties agree, a form is signed. In the present authors' view, this could be appropriate for MUITEL research as both parties have a written record of the agreement.

However, the British Educational Research Association (BERA) highlights some specific problems, relevant to MUITEL, with this arrangement. If the research is conducted over the internet, then researcher and participant may never meet face-to-face. Therefore, negotiating the terms of consent and obtaining a signature may be difficult. Asking a participant to tick boxes in an online form is not a solution, since participants may not read the preamble and the researcher is not present to ensure they have done so. The physical act of signing a consent form (a legally significant convention) can pose difficulties within a mobile paperless environment (Traxler & Bridges, 2004). Apart from the difficulty in confirming consent via mobile technologies, the nature of the system means it is open to confusion regarding full understanding of all facets of the study and the stage or data to which the consent relates (Traxler & Bridges, 2004).

There is also the issue of defining informed consent. An informal MUITEL research project might, for example, involve a child navigating a virtual environment and making sense of the new surroundings. At an early stage of the project the researcher might be unable to explain fully to the child what they will find in the virtual world as this may pre-empt the research design (if an element of surprise or discovery is needed). In addition, if the virtual world contains more than just the researcher and one participant, how much knowledge does a participant require of all the other participants they will meet, in order for them to understand fully what they are consenting to? Problems like these can cause considerable difficulties in understanding the boundaries of the consent.

A further consent issue is raised in family or group contexts. A child may be asked to record aspects of their home life for a project on energy use, and post the results on a class website. Therefore, the results the child posts may include private information about other people with whom they share a house. Should consent be asked of all the occupants of the house in case personal information is accidentally uploaded along with the participant's? This is a central issue for MUITEL research but it is not covered in the frameworks we reviewed.

When using chat rooms and online fora, researchers and participants may have to make themselves known in order to gain informed consent (Blackstone

et al., 2008). Verification of identity in this instance is very important when dealing with or excluding children or minors (Blackstone et al., 2008). This raises the issue of which adults (e.g. moderators, teachers and researchers) are acceptable as participants in, and viewers of, child-oriented chat-rooms and online communities. Just because a person may be a responsible adult, that does not mean they have a moral right to view child-created content, particularly if they have authority over that child.

The National Education Association (NEA – America) guidelines (see Guideline Sources) state that the educator 'shall not unreasonably restrain the student from independent action in the pursuit of learning'. What is considered unreasonable here is open to debate, and must include numerous factors, such as safety, the subsequent effect on others (both participants and researchers) and legal, ethical and moral considerations. Educators and researchers therefore have to be careful that by specifying exactly those things to which a participant consents, they are not unduly restricting that person's educational actions. In relation to these issues regarding consent, the guidelines provide little that is concrete for MUITEL researchers.

The ethical guidelines provided by the British Psychological Society advise giving a briefing before eliciting consent. They also suggest designing the project to give participants the option to withdraw from research if they disagree with the project's development. This raises challenging issues, particularly for long-term engagement with immersive communities. For example, a researcher may encourage a young person to participate in developing an online community where they develop a sense of belonging, involvement and ownership. The guidelines suggest that the researcher tells the participants that they have the right to withdraw from the research if they disagree. But disagree with what? Other participants? The way the researcher is behaving? The researcher taking control? We must ask what effect this would have on the rest of the new community and whether suggesting that someone might leave does actually offer them realistic way of taking control of their involvement. Consequences might include damaging the educational activity of rest of the community at a critical point.

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Access to technology: potential for discrimination and abuse

Rundle and Conley (2007) state that access to new technology may stratify the economic provision of education, giving those who are unable to participate a lesser chance of success. In relation to MUITEL, it raises the issue that only those with the means to participate can benefit from the mobile and immersive facets of education and research participation.

Access to mobile and social networking technology may introduce into educational contexts cyber bullying and other socially damaging practices using mobile camera phones. The use of personal technology by adolescents deliberately to do harm to one another, socially and emotionally, is significant (Byron, 2007; Grinter & Palen, 2002). The subtlety and prowess of such behaviours may mean that they go unnoticed by even the most stringent teacher or researcher. Conflict between teachers and researchers could arise: while the study of emerging behaviours online may be central to the research, it is it acceptable educationally?

There is also concern about the use of private languages and nuanced meanings in such interactions. The rate at which adolescents can generate new, meaningful commentary is impressive, so by moving this sometimes harmful commentary out of

the ephemeral conversation into enduring text, under a teacher's gaze, may lend it weight and legitimacy in the eyes of both recipient and sender. In a non-educational setting, the response to subtle bullying may be to log off, but in an educational setting, this reaction may be less likely, due to the conflicts of participant withdrawal discussed earlier.

It can be argued that schools may reproduce the economic and social relations of the broader society in which they are situated. Therefore the issue of what language is harmful may be context and culture dependent. Any informal learning project that engages with issues of social justice will have to deal with these behaviours pervading the 'relationship possibilities' it creates. Online material could remain visible for the lifetime of the participant, and beyond. So language and content that may be appropriate at one time of life may be embarrassing later. This relates to the issue of dealing with user-generated content, which is discussed in the following section.

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User generated content

In this section, we examine the recent literature on the ethics of using participant-generated data and personal data in research studies. These issues relate to ethical commitments to informed consent, anonymity and data protection. They highlight the need for further reflection on how these issues affect MUITEL research.

Misic and Mitchell (2009) discuss the collection and storage of user-generated content, quoting Lonsdale, Baber, Sharples, & Arvanitis, (2004) five ethical questions on personal data. These are:

- What information do we obtain?
- How do we obtain it?
- What do we use it for?
- What risks are there in doing this?
- What do users think about it?

These points are important when considering how ethical practices might operate in MUITEL research. Misic and Mitchell (2009) suggest an addition to the consent form stating that 'the Internet is not a safe medium, and there are potential security risks where data are gathered, stored and used'. This is a limited response to a problem that must be considered carefully.

Blackstone et al. (2008) suggest that using material comprising text or pictures from Internet users can be problematic, especially if identification of individual authors is concealed as part of the research. For example, potential authors must give their consent to the use of their material by third parties. If this is achieved by signing in to a system, their identity might be partially revealed. Blackstone et al. (2008) point out that this issue depends on the context where the material was created, and how it will be used. For example, if a chat room is considered by its users to be public, that leaves relatively few confidentiality issues; if considered private, these issues are abundant, especially with anonymous users, where their identity might be compromised by signing into the system.

In a case study mentioned on the Australian Society for Computers in Learning in Tertiary Education (ASCILITE) website (Applebee, McCormack, & Donnan, 2002) an online educational course was taught by the University of Australia to home and international students. The researchers found postings to a course bulletin

board that recorded tensions between international and Australian students. The student postings were made anonymously and consent was not asked for their use in research. As the research progressed, complaints were made by some of the students involved, who argued that although no names were given while posting, the context of some of the quotes revealed in research publications made their author's identity obvious to outside parties. One student expressed anger that he had not been asked for his consent to engage in research, stating that he could easily be identified and that if he had known his 'anonymous' posting would be published as part of a research project he would have changed his wording or not posted.

This is further confounded when addressing the issue of whether an ability (by a member of the public) to gain technical access to an online environment is equivalent to that resource being made public. Bakardjieva and Feenberg (2000) discuss this issue, and summarise the existing disagreements. They refer to a continuum of levels of privacy in real and virtual settings proposed by Robson and Robson (2002) and indicate there is a broad 'grey area' of uncertainty. The diversity of user-generated content may require a more subtle definition of what is public or confidential. This issue will be discussed again later in this review.

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Attachment

An area of concern encountered in the current 'grey literature' surrounding MUITEL, was the ethics of attachment, where a participant is loaned a personal device or immersed in an online world, becomes attached to or dependent on it, and is then deprived of it at end of the study.

Comments from a High School Principal posted on a blog about mobile learning (Mobile Learning Blog, 2010) raise interesting ethical points regarding the introduction of mobile technology to students. On the blog the Principal states that:

> I would add that while students view their cell phones as a social toy, they also are possessive of them as a personal communication tool, almost as personal to them as their lips and ears. I have observed that asking a student to give up his or her cell phone is like asking for their ear or mouth. (Principal, Mobile Learning Blog, 2010).

Researchers working in the area of MUITEL need to consider what effects giving or loaning technologically advanced hardware to their participants will have upon them. If a project distributes mobile technology to participants for the duration of a study, they will become accustomed to the device as the project develops. This attachment may be increased if the student has added personal information on the device (such as contact addresses), or has saved personal exchanges (such as text messages).

A related issue is determining whether the content captured or created during a study is owned by the participant or the researcher. A possible solution to this issue for MUITEL researchers, might be to download all material on the device and provide it to the student as a personal record at the end of the study. However, for technical reasons this may prove difficult during some projects, for example, it may only run on the loaned device. The researcher must also make sure that the machine is fully reset before handing it to another student and that no personal data are carried over.

An additional ethical issue is the impact that temporary ownership will have on the participant's personal feelings. Introducing expensive technology to participants

from an economically deprived background may enhance feelings of exclusion from those that can afford the technology, emphasising that they could not normally purchase such a luxury.

Some participants may be reluctant to become attached to a device that is not personally owned. Research from a study involving loaned personal digital assistants found that some of the students did not fully adopt the devices due to them being loaned and not given. The students were reluctant to invest time and money in personalising and extending the PDAs if they were unable to keep the devices at end of the project (Corlett, Sharples, Chan, & Bull, 2005).

Another issue relating to attachment is that of 'cool' technology. MUITEL researchers may discover that some children/students are embarrassed to utilise devices supplied to them because they are not 'cool', due to colour, make or the device itself. For example, a study by Cochrane and Bateman of students using phones supplied by their institution found that some students were reluctant to use the devices: 'I did not use the phone as much as I wanted to – I really like the whole idea – just not this phone' (Cochrane & Bateman, 2010, p. 15). Consequently, a student involved in mobile learning research may refuse to operate the device in front of their peers, which could have a detrimental effect on studies researching MUITEL in social situations. In response to all the attachment issues mentioned in this section it is important for MUITEL researchers to carefully consider the social context as well as the educational setting within which their research is operating, and to tailor their research appropriately.

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Introducing unsuitable materials

The issue of what materials in MUITEL research are unsuitable depends upon the age of participants. Misic and Mitchell (2009) make an important distinction between 'children' (0–18 in the UK, via United Nations, 1989) and 'minors' (12–20, depending on country). This distinction is important in the legality of international research in this field.

Offensive content can vary immensely and is dependent upon the context and the cultural environment (Misic & Mitchell, 2009). This may have a profound effect on the nature and content of international MUITEL applications. Traxler and Bridges (2004) state that it is the duty of the researcher to limit the risks posed by participants accessing or being exposed to spam, harassment, abuse, hate mail and harmful external websites. However, they also have to inform participants and their parents or guardians of the potential risks. But the contextual elements of what is considered harmful or abusive are diverse. These become increasingly more complex when combined with the issues of user-generated content. An example is the practice of 'obscene picture messaging', over which the organisers cannot have control but for which they might nevertheless still be legally responsible (Traxler & Bridges, 2004). Even disciplinary measures only deal with the matter after the incident, and could therefore be considered ineffective (Traxler & Bridges, 2004).

Misic and Mitchell (2009) created a set of bespoke guidelines for participants of their project concerning invasive or offensive user-generated material. They also state that rules for participation prohibited harassment, inappropriate commentary and spamming. This requires moderation, with the decision about which content falls into these categories being taken by the teacher/mediator, as a professional responsibility. Carmichael and Youdell (2007) support this approach,

including single account operation, arguing that a positively framed behavioural code, rather than a punitive one, encourages honesty, respect and dignity. This may provide the basis for a level of discipline below expulsion (such as 'two warnings'). Contextual issues arise about deciding when valid argument is deemed disrespectful, requiring careful and immersed mediation. This puts a teacher into possible conflict with a researcher, since the researcher may wish participants to debate or express views that a teacher finds unacceptable. Carmichael and Youdell (2007) propose a re-definition of the term 'anonymity' to take into account the plethora of surrounding information that comes with immersive interactions. This includes group or associative identity that the participant may not be aware of beforehand.

Intrusion of privacy

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There is potential for researchers working in a virtual environment to become blasé about the issues of privacy as face-to-face contact can be avoided and it is relatively easy to hide the physical identity of participants (Turkle, 1995). However, the consensus of the ethical guidelines reviewed is that great care should be taken to maintain the privacy of participants. Researchers should not assume that because online participants are anonymous they are also unidentifiable. Identity itself can be a focus of MUITEL research with informal immersive technology being utilised for investigating identity, community development and interpersonal relations (Lally & Sclater, 2010; Sclater & Lally, 2009). While considering the advice in ethical guidelines of maintaining anonymity where appropriate, researchers should, however, question whether it is feasible for their particular research. For some MUITEL research projects, having a group meet anonymously might be detrimental to the project's ability to build a cohesive community and so aspects of privacy must be considered through the designs of the particular research.

Traxler and Bridges (2004) note the possibility of mobile devices revealing aspects of the participant's identity, such as location or the model of device. This may occur without the participant's knowledge or consent. A related issue is that if research documents publish text quotations from online discussions, then entering the text of the quotation into a full text search engine such as Google may reveal its source or context. Researchers need to understand that methods to hide or uncover online identities are different to those in the traditional academic world. Traxler and Bridges (2004) maintain that it is the responsibility of the researcher to indicate to participants all ways that their identities might be revealed and used in research.

Holland et al. (2008) discuss the ethical significance of the intended audience of the research findings. They describe how one participant was happy to have transcripts and videos shown to the academic community, but was sure that, despite measures to secure anonymity, they would be recognised, and their interactions perceived negatively by their peers or parents. Specifying the dissemination outlets should be an explicit part of consent, at any age, so that the participants are aware of who will be allowed to view their activities and contributions.

Traxler and Bridges (2004) suggest the need for clear and continuing distinction between public and private interactions. The belief that the interaction is private

when it is not, or vice versa, could have an impact on how participants contribute, and the status of their consent. The awareness, by both researcher and participant, of the privacy status of their study needs to be ongoing, as some activities can rapidly alter participants' and researchers' wishes regarding privacy. Holland et al. (2008) showed that when participants carried out work individually with the researcher, the opportunity to compare commentaries with other participants to get their feedback as a group was lost. This was because of ethical (privacy) issues surrounding participants having access each other's data.

Unmonitored spaces

Another major ethical issue affecting MUITEL research is that of moral obligation and conflicts of professional conduct. Take a hypothetical scenario, in which a participant has been given a mobile video device to record a visit to a science centre for a study on self-directed learning. While analysing the participant's videos the researcher becomes aware that the participants have not been adequately supervised and several health and safety violations have occurred. Ideally, the researcher would like to perform follow-up work with the same participants, but worries about how safe they are under the care of the teacher. Morally, something should be said to prevent any harm coming to the participants on the next visit. However, this may jeopardise the working relationship between the researcher and the school, and possibly prevent further research and the completion of the project. A related issue may also occur if the researcher captures an incident, such as a fight between children, on video, and the school requests the recording as evidence for disciplinary proceedings. Furthermore, an issue could arise where a MUITEL project provides private space for its participants and in that space conversations happen that, from the researchers' point of view, contain morally suspect matters. This presents an ethical issue that is difficult for the researcher to resolve, with potential conflicts of interest.

Summary

In this section, we have reviewed and analysed the general ethical guidelines of each of the 12 organisations identified as offering ethical guidance that may be relevant to MUITEL researchers. We have organised this analysis thematically, and presented potential or actual ethical challenges for MUITEL researchers. We have also indicated possible solutions, and highlighted situations where the challenge remains problematic or unresolved. All the associations highlight the need, above all, to do no harm. However, what precisely constitutes harm in the guidelines, and research in general, is based on a complex mixture of moral, legal and personal criteria. This presents challenges for MUITEL research in informal settings with its particular propensity to straddle traditional research boundaries.

A research dialogue: the possibilities and challenges of conducting ethical MUITEL research

The purpose of this discussion, between the authors, was to elicit and clarify our perspectives on the ethical issues surrounding MUITEL research ethics. We had

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access to the thematic literature review presented above. We were all involved in TEL projects at the time, and four of us were directly involved in MUITEL research. We wanted to bring this alive by providing this (paraphrased) account of our own interpretations of the issues, and reflections on our experiences when working within a MUITEL research framework.

The first of the issues discussed was that of 'boundaries', and specifically the disappearance or blurring of them during MUITEL research. Much of the research in teaching and learning up to this point has relied on the assumption that agreed boundaries exist within the research context:

- That teaching occurs in the classroom or science laboratory.
- That all students will learn at the same time, within the same physical space.
- That learning is a public and transparent activity, held in a distinct partition from personal or social endeavours.

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When looking at learning in the MUITEL context, it is apparent that these boundaries will at the very least be blurred, if not altogether eradicated. It is a challenge for the researcher to identify the extent of this effect, and to show that this is what is intended, and ensure, for ethical purposes, that this is clear to all parties involved in the research. The need to be honest about the extent of data collection, storage and uses, as well as being open about the dissemination of the findings, is crucial. The unpredictability of informal and mobile learning activities encourages a more flexible and sensitive methodology. An example from the Personal Inquiry project concerns the practice where pupils are loaned laptops over extended periods, for use in and out of school (Anastopoulou et al., 2008). Although pupils may be aware that their uses of particular software applications were recorded, researchers had to ensure the students knew that all uses of the laptop (web browsing, downloading, etc.) would be stored. The possibility that students did not see these informal activities as recordable had to be considered.

Another point of interest emerging from this was concern about reducing the authenticity of informal observations. As interest in social, mobile and informal learning grows, researchers begin openly to discuss recording such actions. How will this monitoring influence the participant? For example, will browsing habits change, and how will this transform the use of online or social tools?

An example from the Inter-Life project illustrates the complexity of the boundary between what is considered private and what is not, in the eyes of the participant. While providing a creative, immersive online learning environment for project participants, the decision was made to record all interaction, to help in the event of a problem (e.g. bullying). However, in order to allow participants the opportunity to collaborate in private (if they wished), 'virtual diary rooms' with controllable recorders were also provided. This gives the student a clear option to be recorded or not, making the privacy boundary much more visible. Yet it also meant that automatic recording of all events was no longer guaranteed.

This type of activity may lead to unpredictable outcomes. An example from the Ensemble project was discussed in our dialogue, where university student participants in a case-based learning study transposed the task away from the controlled conditions of the researcher's online tool, onto a popular social networking environment. The blurring of the formal/informal boundary places a degree of control into the hands of the participants, as they can decide on which side

of the fence their social interactions lie. How to continue after such an event is problematic.

> If you have a fairly broad consent and then the rules of engagement change in the way that you're saying- you're wanting to study children's or students' informal learning practices, you give them some tool that they're working on and then they migrate to another tool, do you have the right as a researcher to follow them into that new space, whether it's virtual or physical? (MUITEL Researcher Interviews, 2010).

With the increased unpredictability of MUITEL research must come a more thorough exploration of informed consent. As the data collected in these studies widens in scope, researchers will have to make great efforts to ensure participants understand what they are giving consent for. It seems unacceptable to us that, given the sensitivity of the data collected, that participants should not have a good grasp on the aims of the study.

> We did find that there were different understandings of the terms that we were using because we were working in different disciplines where maybe in a law setting or a historical setting, just the words would mean something different. It was important to have that conversation with people and to maybe adapt the wording in the code of practice for that setting as well. (MUITEL Researcher Interviews, 2010).

It strikes us (the authors) that the best way to ensure participants have a better understanding of research work, and are comfortable about what is recorded, it is to talk to them. One of the key factors we have identified in successful MUITEL research is the consequent re-positioning of the role and status of the researcher.

> There's arguably an arrogance of researchers, just as there's an arrogance of teachers, which goes that any research subject, providing they're provided a letter of consent, the researchers should have the right to probe into all the activities they're doing. Same with the teaching, the teacher has a right to manage all the learning that is related to school, whether it's inside or outside the school. I think we've got to be a little more respectful of the learning activities of children. (MUITEL Researcher Interviews, 2010).

The idea of a participant as a passive party, as the 'subject' of a study is, we suggest, incompatible with this type of research. Iterative and participatory approaches, including consultation and agreement with participants, are two ways forward. For example, the terms of a consent form could benefit from the input of the people who will sign it. This will aid the understanding of the participant; it may foster a sense of the significance within the study. The negotiation and, re-negotiation with participants can lead to a more authentic engagement with the project, and hence enrich the outcomes of the research.

What might the move from traditional ethical practices, to the ones described here, look like? We began to answer this by discussing the existing frameworks and how we use them.

> We have come across different types of ethical reviews and found that the ones that inspire reflection and allow for a more discursive response in the form have actually been far more useful than the tick box-style review that asks you to predict all future methods and classify the roles of all the participants. (MUITEL Researcher Interviews, 2010).

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We found that the existing models of ethical practice were very useful as a trigger to discuss and design more context specific practices. The limitations of the current ethics process when engaging in MUITEL research were highlighted.

It's not a lot of help because the formal process that we've gone through here has really failed to grasp some of the issues of a project, and has granted us ethical approval whilst, in my judgement, failing to understand the actual issues we're facing. (MUITEL Researcher Interviews, 2010). This suggests that the complexities and subtleties around research in this area are not, at this time, being appreciated.

> The problem with the formal process is that it's a single event and it happens at the beginning of the project. You don't really get any feedback besides pass or fail. You'd probably get more feedback if you failed but that in itself might give you the impression that that was all the consideration of ethics you really needed to do, but that's not it at all. (MUITEL Researcher Interviews, 2010).

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Ethical review processes are most valuable in MUITEL research if they are understood not as 'approval' or 'clearance' but as contributing to, or even initiating, formative and dialogic practice. So while the existing frameworks and processes are useful as an initial evaluation, researchers in MUITEL must consider how these should be extended to deal with the variety of informal, immersive and mobile activities we facilitate.

The vital question remains: how do you construct a more comprehensive ethical process, particularly in boundary-crossing areas like MUITEL research? One suggestion is that an extended ethical statement could be constructed, and used to establish a more independent, informal review mechanism. For example:

> One of the things that has developed in the project is to establish independent ethical review panels stimulated by the project. So we have one in location A and one in location B by which we can run the developing procedures as we negotiate them with the young people. It feels like it offers the possibility of some reassurance, and the involvement of another set of professionals who don't have a vested interest in the project as insiders, having the opportunity to comment on things as they develop, which feels a bit better. (MUITEL Researcher Interviews, 2010).

The most striking similarities between the authors' views on ethical processes arose here. We believe that the expertise of the researchers familiar with the field should be harnessed because they understand best the challenges of their research. At the same, the issues raised can be reviewed in an ongoing process, helping to create an environment of clear understanding and co-operation, over the entirety of the project. Using the experience of colleagues in this way may help to build a code of practice specific to the context, while at the same time being fluid and flexible to the needs of the study and its participants as it develops. We strongly advocate this iterative, incremental model of ethical design.

> People who are doing research in this area need to see ethics as being a process which is developed throughout the research and maybe needs to be modified throughout the research, rather than it just being seen as a threshold at the start. (MUITEL Researcher Interviews, 2010).

This may sound more labour intensive, but we think that this is how the future of ethical processes in this field might evolve.

> I think you need to see it as part of the role of being a researcher, that you are constantly considering the consequences and what-ifs and thinking about what is a good thing or a

bad thing to do. That isn't compartmentalised into 'ethics' even, it's just good quality research. (MUITEL Researcher Interviews, 2010).

Conclusion

In this article, we have attempted to examine ethical dimensions of researching the MUITEL. We began by trying to analyse the interactions between mobile, ubiquitous and immersive technologies and the wider context of the 'digital economy'. In this analysis we identified social, economic and educational developments that blur boundaries: between the individual and the consumer, between the formal and the informal, between education and other forms of learning. This has led to a complex array of possibilities for learning designs, and an equally complex array of ethical dimensions and challenges for researchers.

We then examined the recent literature on the ethical dimensions of TEL research, and identified key trends, ethical dilemmas and issues for researchers investigating MUITEL in informal educational settings. We then used a research dialogue between the authors (as researchers) to illuminate these MUITEL research challenges in the context of real-world research, and indicate new approaches to ethical procedures that may offer ways forward for researchers in this fascinating field.

Ethical frameworks do not act to aid arbitration or decision-making. Instead, they provide a framing for questions to be raised about how our use and development of advanced technologies might represent a challenge to our ethical practice and that of research participants, and as a tool to encourage reflection as to how these tensions could be resolved. All the international ethical associations and frameworks related to MUITEL education analysed in this article emphasise the importance of the researchers' personal integrity in solving ethical issues. Project discussions in which ethical issues are regularly revisited are key to conducting ethical research and realising Elliott's 'ethically committed action' (Elliott, 2006). Elliott argues this is premised on 'disciplined conversation in which reasons for action are scrutinised, critiqued and modified', and connects this approach with the Aristotelian concept of phronesis, or acting appropriately in changing circumstances, as a distinctive form of ethically informed practical reasoning (Hughes, 2001).

Ethical guidelines and processes are not moral certitudes, but reflect the shifting values of society. Only through interacting with participants, other professionals, and researchers, and discussing ethical values, can MUITEL research in informal settings become ethically sound by consensus. It seems to us that ethical issues need to remain open questions, and be revisited, as part of research practices. Because technologies and relationships develop, ongoing reassessments will always be required in the light of new understandings. We hope that this approach will inspire and support continued reflection and discussion about how to conduct ethically committed MUITEL research.

Guideline sources

AERA: American Educational Research Association
http://www.aera.net/AboutAERA/Default.aspx?menu_id=90&id=222
ASCILITE – Australian Society for Computing and Learning
BCS: The Chartered Institute for IT
http://www.sqa.org.uk/e-learning/ProfIssues03CD/page_04.htm
BECTA: General ethical Guidelines

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http://partners.becta.org.uk/index.php?section=rh&catcode=_re_rs_pr_et_04&rid=16271
BERA: http://www.bera.ac.uk/files/guidelines/ethica1.pdf
BPS: British Psychological Society
http://www.bps.org.uk/the-society/code-of-conduct/support-for-researchers_home.cfm
Link Includes – Ethical Principles for Conducting Research with Human Participants
Guidelines for minimum standards of ethical approval in psychological research
Conducting Research on the Internet: Guidelines for ethical practice in psychological research online (2007)
ESRC: Economic and Social Research Council (pdf)
http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC_Re_Ethics_Frame_tcm6-11291.pdf
HSRC: South African Human Sciences Research Council
http://www.hsrc.ac.za/Corporate_Information-6.phtml
NEA: National Education Association (America)
http://www.nea.org/home/30442.htm
SERA: Scottish Educational Research Association
http://www.sera.ac.uk/docs/Publications/SERA%20Ethical%20GuidelinesWeb.PDF
SRA: Social Research Association
http://www.respectproject.org/code/index.php
TLRP: Teaching and Learning Research Programme
http://www.tlrp.org/capacity/rm/wt/bridges/
additional refs

Relevant websites

Example of online problems/appropriate response to problems
http://schools.becta.org.uk/index.php?section=is&catcode=ss_to_es_pp_aup_03&rid=12002
E safety Policy
http://schools.becta.org.uk/index.php?section=is&catcode=ss_to_es_pp_pol_03
Safe Internet Use
http://schools.becta.org.uk/index.php?section=is&catcode=ss_to_es_tl_uor_03&rid=1752
E-safety: Developing whole-school policies to support effective practice
http://publications.becta.org.uk/display.cfm?resID=25934
Acceptable Use Policies (AUPs) in context: Establishing safe and responsible online behaviours
http://publications.becta.org.uk/display.cfm?resID=39286
Mobile technology and e-safety –
http://schools.becta.org.uk/index.php?section=is&catcode=ss_to_es_pp_mob_03&rid=17223
Upholding scientific standards
http://www.respectproject.org/code/cstds.php?id=
Compliance with the law
http://www.respectproject.org/code/clegal.php?id=

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Avoidance of social and personal harm http://www.respectproject.org/code/charm.php?id=

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Notes

1. http://www.learning-solutions.co.uk/braingym2.php
2. http://www.ensemble.ac.uk/

Notes on contributors

Professor Vic Lally is Leader of the Interdisciplinary Science, Education and Technology Learning Group at the University of Glasgow, UK.

Professor Mike Sharples is Director of the Learning Sciences Research Institute at the University of Nottingham, UK.

Dr. Frances Tracy is Senior Lecturer in Education Studies at Liverpool John Moores University, UK.

Neil Bertram is a PhD Researcher in the MRC Social and Public Health Sciences Unit at the University of Glasgow, UK.

Sherriden Masters is a PhD Researcher in the Learning Sciences Research Institute at the University of Nottingham, UK.

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