Addressing Methodological Issues in e-Learning Research

Grainne Conole[1], Martin Oliver[2], Kim Isroff[2] and Andrew Ravenscroft[3]

University of Southampton[1], University College London[2], London Metropolitan University[3]

INTRODUCTION

As a relative young field, learning technology research suffers in a number of respects (Conole, 2003). Firstly, the area is not yet clearly defined and scoped. Secondly, there is criticism of much of the current research activities, as it is considered too anecdotal, case-based, and lacking theoretical underpinning. Thirdly, as indeed is true in social science research more generally, there are divided views on the importance of quantitative versus qualitative research methods.

This paper focuses on the first two of these criticisms. Firstly, an overview of the area will be provided, in response to criticisms of definition and scope. Secondly, a critique of the methodological issues will be given and in particular which methodologies are favoured and why. Thirdly, the criticisms that the area suffers from a lack of theoretical underpinning will be discussed. Finally, the paper concludes by arguing that learning technology research should be articulated within a broader and more holistic socio-cultural framework. The paper provides an overview for the symposium and is followed by three case study papers which take forward these issues by critiquing specific areas and applications of learning technology research.

Every discipline has its own epistemological beliefs and associated culture. This consists of three inter-related features. Firstly, the area is shaped by the nature of the research questions being explored. Secondly, it is shaped by the research methodologies adopted and the ways in which these are used to address the research questions. Thirdly, it is shaped by the underpinning theory and theoretical perspectives adopted and used to try and making sense of research findings.

Keywords
Learning technology research, methodological issues

RESEARCH QUESTIONS

Learning technology research in general is concerned with understanding how technology can be used to support learning and teaching. It involves an underlying motivation of improving the student learning experience, as well as exploring the impact of ICT from individual through to institutional level. The fundamental question, perhaps is how can technologies be used to enhance learning? Other central questions include:

- What are the technical, managerial and infrastructural requirements to develop effective learning environments?
- What protocols and standards are needed to ensure materials can be easily transferred between systems?
- How can we ensure accessibility and deal with copyright and plagiarism issues?
- What new pedagogical models are possible and what is their impact?

These are just some of the questions being addressed by researchers in an area, which covers a spectrum of topics grouped around three main themes – pedagogical, technical and organisational.

The first research theme is concerned with the pedagogy of e-learning and, in particular, the development of effective models for implementation, including the application of learning theory to instructional design and use of technologies. Work is needed on the development of guidelines of good practice and support mechanisms to develop the e-learning skills of tutors and students. Another area of research lies in understanding the nature of online communities and different forms of communication and collaboration, as well as exploring different models for online courses.

The second area focuses on technology, both technical tools and the development of architecture to support different types of learning, as well as standards to ensure interoperability between systems. This includes exploring mechanisms for tracking activity online, exploration of the nature of different types of virtual

presence, mobile and smart technology and the development of context sensitive and tailored learning environments.

The third area is concerned with organisational issues, such as formulating strategies for integrating online courses within institutional structures and the seamless linking of different information processes and systems.

METHODOLOGICAL ISSUES

It is worth reflecting on the research methodologies which are used to explore the research questions outlined above and also to critique the role of ICT itself in research methods. The choice of methodologies and the way in which it is carried out in terms of the data collection and analysis will have a critical impact on the value and worth of the research findings (Conole, forthcoming). Choice of appropriate research methods will depend both on the nature of the questions being considered and on the researchers and associated stakeholders in the research findings. These groups may have conflicting agendas and are likely to place different values on methodological approaches. Broadly speaking there is often a tension between the needs of policy makers and senior managers, academics and support staff and the students engaged in the learning process. The first group are much more likely to be interested in potential efficiency gains and cost effectiveness associated with learning technologies and will want to see evidence-based practice with comparison of the benefits of new technologies over existing teaching and learning methods. The latter two in contrast are more likely to be interested in focusing on improving the student learning experience.

Not surprisingly given the feeder disciplines from which learning technology has emerged (education, psychology, computer science etc), there is a wider spectrum of research approaches being used to conduct learning technology research. However, some methods are more prevalent than other which can be accounted for in terms of the characteristics of the area (see Conole, 2004 for a more detailed discussion of the characteristics of learning technology as a discipline). For example action research and evaluation are used extensively, which can be explained in terms of the importance of linking findings back into practice and the importance of ensuring stakeholder engagement in the issues being addressed. In contrast, in the UK as least, there is a strong lobby against evidence-based practice, because there is a belief that there are fundamental epistemological issues with using this approach in learning technology (Oliver and Conole, 2003).

New and innovative research methodologies are also been developed. There has been an increase in using ICT for data collection and analysis and a move towards mixed modal methodologies which triangulate across different approaches. Beetham and Conole have previously described the importance of the development of a sense of shared ownership and co-participation in learning technology research, in part because of the practical pragmatic dimension to the area but also because of the highly political nature and dependences on stakeholder perspectives (Beetham 2001; Beetham and Conole 2001). They describe a multi-modal approach to data collection. As a result of this co-participative approach users were much more engaged with the process of data collection and had a shared sense of ownership and responsibility. This meant that a much richer set of data were collected, which were also more authentic and hence representative of the community.

There are also increasingly innovative uses of the technology itself as a tool for research. For example there is now a wide range of software available to facilitate research; for example online web surveys are increasingly being used for data collection and various statistical and qualitative packages have emerged to support data analyses. These tools enable the researcher to focus less on routine collection and calculation and more on the analysis of outputs (Conole and Dyke, 2004).

Furthermore, interactive e-journals are now changing the nature of academic discourse and the relationship between authors and referees (Hey, 1997, Ingraham, 2000), similarly specialised gateways such as SOSIG have emerged which help to categorise resources but raise interesting questions about quality control and scope. Free academically owned publishing mechanisms such as e-Prints are now becoming more respected and referenced within the research community, but how does this impact on the future of more traditional journals?

However the increase harnessing technologies for research raises a series of questions, such as what are the particular problems posed in terms of validity, representative-ness, inclusion/exclusion and ethics?

THEORETICAL POSITIONS AND THEIR IMPACT ON RESEARCH METHODS

Although the theoretical position of the researcher is fundamental to their interpretation of data, this relationship remains largely unexplored within the context of e-learning research and evaluation (Oliver & Harvey, 2002). Where this relationship is explored, it is often to lament the lack of scientific rigour (Mitchell, 2000).

Importantly, criticisms such as this focus upon method (techniques) but remain silent on methodology (the 'science' of method, implying a commitment to a theoretical or philosophical position).

Although similar criticisms can be made of the wider field of educational research (e.g. Usher, 1996, who criticises its lack of reflexivity), what is distinctive about e-learning research is that awareness of the problem is generally lacking. There are some notable exceptions, however. Hodgson *et al* (2001), for example, note the general vagueness over methodology in much published research and a tendency towards objectivist perspectives on e-learning. Such work largely relies of naïve measures of effectiveness such as exam score difference or Likert-scale expressions of satisfaction. They also question whether the adoption of research methods designed for face-to-face settings are appropriate to use online, illustrating (for example) how new approaches have developed for the analysis of asynchronous computer-mediated communication (CMC). Likewise, McConnell (2001) explores the relationship between technology and methods. He observes, for example, that research that uses CMC seems to encourage participant engagement, whilst that which uses technology to distribute research instruments diminishes it; that transcripts automatically arising from networked learning can be used as a stimulus for discussion in interviews; and that data arising from CMC can be analysed using traditional methods such as grounded theory or ethnography. However, Jones (2001) questions whether the assumptions of ethnography require modification when it becomes 'virtual ethnography'. He notes the opportunities for misunderstanding, but concludes that the ethnographic emphasis on participation is important if the researcher is to appreciate what this experience is like for their research participants.

The impact of such discussions are significant, if largely unobserved. For example, in America, particular theoretical positions have now been enshrined in law. The "No Child Left Behind" act and the associated National Research Council report place explicit value on experimental studies within education. Taking an activity theoretic perspective, this situation introduces conflicts into current systems of research. Specifically, in Activity Theoretic terms (Issroff and Scanlon, 2002), a contradiction arises between the rules of the community and those of individual subjects. This is deliberate: by sanctioning (and funding) certain kinds of research at the expense of others, the government is creating problems for researchers whose theoretical positions differ from their own. Specifically, researchers working within a relativist (typically, qualitative) paradigm are disadvantaged by this development, whilst those with an objectivist perspective (typically, quantitative) are advantaged. This legislation provides them with new tools (permissions and funding) allowing more opportunities for research activity than was previously the case. Such governmental sanctioning of theory via method has been challenged as being philosophically, socially and morally inappropriate (Oliver & Conole, 2003).

An explicit example of this can be seen in research on computer-supported cooperative learning (CSCL). In Issroff (1993) guidelines for research are set out. Research within CSCL started in developmental psychology and initially used rules, tools, divisions of labour etc developed by that community. Over the last ten years there has been a shift in research in the area towards naturalistic learning settings with an emphasis on practical applications and use. This shift has led to a change in the research methodology used. Issroff's guidelines reflect this shift. One of the contradictions which led to this change was that research on the use of technology in artificial settings led to expectations and findings which then were difficult to translate into information that was useful in real learning settings. The realisation that context and other features of the setting make a difference led to a change in the rules of practice for this community. One example of this is the way in which students are put into pairs/groups. Theories of cognitive conflict led researchers to create collaborating pairs of students who were matched by their conceptual knowledge (either the same or different). This theoretically-driven methodology was very fruitful in terms of understanding the role of conflict. However, researchers realised that other factors also impacted upon collaboration – for example, friendship. This led to a contradiction between the tool (the research methodology) and the object (to carry out research that is relevant to practice).

The implication of these examples is clear. If, as Hodgson et al (2001) argue, theoretical commitments remain vague in e-learning research, problems will continue to occur. Inappropriate inferences will be drawn from published papers and interdisciplinary teams will encounter problems attempting to undertake research. Two developments are possible in response to this. Either a single position will be advocated (as in the US), causing problems for any 'deviant' who believes differently, or else all e-learning researchers will have to be encouraged make their position clear, so that differences can be understood and respected (for example, by judging each piece of research on its own merits). Although this latter option is likely to be harder to achieve, it is doubtless the more desirable, since such community-led revision of acceptable rules of practice through critique and discussion represents an important opportunity for social learning within the field.

CONCLUSION

To conclude, in order to address the criticism that learning technology research lack scientific rigour, we argue that learning technology research needs to be articulated within a broader and more holistic socio-cultural framework for cognitive change (Ravenscroft, 2002, 2003a). There needs to be a clear conjoining of research into socio-cognitive and socio-cultural aspects of the educative process. This ambitious approach will require explicitly integrate theoretical, empirical and computational (or design-oriented) approaches and consideration of the methodologies of cognate disciplines within an 'educational socio-cognitive science paradigm'.

In light of this we argue that in learning technology research we need to 'think outside the box', whilst being systematic and 'scientific' about how we do this. As part of this reflection we also need to be mindful of the use of research findings and in particular its relevance to policy and practice. We must not forget that learning technology research is a practical and applied discipline which is contextualised in nature.

The paper has provided an overview of learning technology research and associated methodological and theoretical issues. As part of the symposium the paper is linked to three case studies which explore particular aspects of the general arguments discussed here in terms of their relevance for networked learning. Alsop and Tompsett consider the use of two approaches which have gained considerable popularity in the area in recent years; namely the use of grounded theory and activity theory. Jones considers how quantitative and qualitative approaches can be brought together in a meaningful way, given an example of the use of phenomenography. Finally, Steeples reports on the use of an action/participatory research approach. We would like to build on this initial set of papers and invite others to develop case studies and then report on this as a follow up at the ALT-C 2004 conference in September 2004.

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