The E-Research Project: Developing an IMM Resource for Supporting Communities of Learners Through CSCL

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ABSTRACT

In this paper I discuss learning issues arising from the design and development of an IMM resource, the E-Research CDRom, for teaching postgraduate students about educational research methodologies in networked collaborative learning environments. The main features of the CDRom are described and the policy and practice context for its production given. The main part of the paper focuses on eight learning and design issues that arose from both the literature and the practical experience of developing the CDRom. In the conclusion, I briefly describe the limitations of the resource and possible directions for future research.

Keywords
CDRom, educational research methodology, Higher Education, learning

INTRODUCTION

The focus of this paper is learning issues in the design of an Interactive Multi Media (IMM) resource for use in networked collaborative learning. The IMM resource, called the 'E-research CDRom', is targeted at Masters and doctoral students learning about educational research methodology. The project team of 9 people, (six academics and one technician) from the Department of Educational Studies and two media advisors based at the University Learning Media Unit collaborated to produce the pilot IMM resource. The intention was to complement existing paper-based materials for a research methodology module as generic content for courses both in the department and more widely across university social science departments.

The purpose of this paper is to present some tentative ideas to contribute towards the future development of a better design of IMM learning resource. Stahl highlights the need for improved communications between the three communities involved in producing IMM resources: designers, users and researchers:

> The better we can understand how the processes involved in collaborative learning actually work, the better we can design computer support for them and the better we can evaluate the effectiveness of the learning and of the support (Stahl, 2003, p2).

The CDRom was produced without an initial explicit sharing of beliefs about pedagogy, epistemologies or theories of learning amongst members of the team. Nonetheless, these beliefs underpinned and framed the development of the IMM resource and influenced the process of its production. In a sense, then, this paper is a retrospective investigation of these beliefs, in the light of existing research in the field. I begin by describing the e-research IMM resource and giving the rationale for its production. I then focus on several learning issues that have arisen during its evolution. In the conclusion I briefly address the limitations of the resource and the possibilities for future research.

THE CDROM DESCRIBED

The e-research CD Rom is a **pilot** IMM resource covering a range of educational research methodology topics, developed in a short time with limited resources from a small University grant. Although it has not yet been tested in networked learning contexts, the team's aim was to produce a resource that was ultimately flexible – that could be used by individuals or collaborative groups; in a range of on-line, face-to-face or blended courses, on-campus or off-campus, but with features particularly appropriate for the distance learning, part-time learner making up a major part of the target audience at masters/doctorate level. The unique contribution of the e-research CDRom lies in its potential for adding value to courses in the context of networked collaborative

learning by providing the opportunity for learners to join two learning communities – that of the educational research community represented in the resource as well as the on-line community in which they participate.

At the outset, plans were made to produce an on-line IMM resource, but these were revised when opportunities arose for its use in a particular overseas location where internet access is unreliable and costly. Moreover, other advantages of CDRoms over on-line resources became apparent: the longer history of design tools facilitating development; the speed of accessibility of the disc resource over the web; uniform hardware compatible across platforms; dependability; robustness and low costs of production. (Vogel and Klassen, 2001). On the other hand, the major disadvantage of the CDRom over the web for an IMM resource is the difficulty of up-dating – a crucial consideration in times of rapid change in educational research methodology epistemology (Denzin and Lincoln, 2000). The e-research CDRom is currently being evaluated.

There are ten sections in the e-research CDRom, five of which focus on higher education research students and 'experts' as video images and voices telling stories of their research experiences, together with supporting text. Other sections include an introduction to Computer Assisted Qualitative Data Analysis (CAQDAS), using Nvivo and Nudist; annotated resources (annotated bibliography and webography); a section on research writing and an interactive glossary (See Figure 1 below).

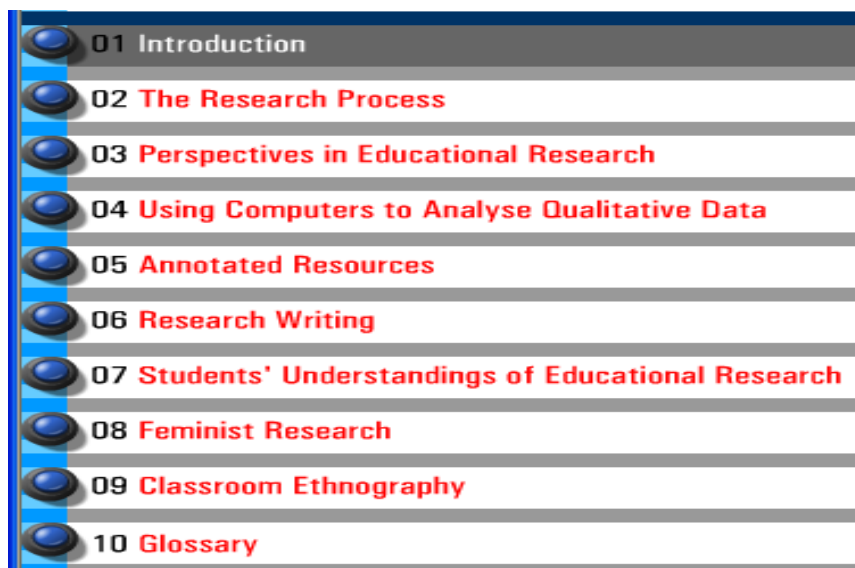Figure 1 The menu of the E-Research CD Rom

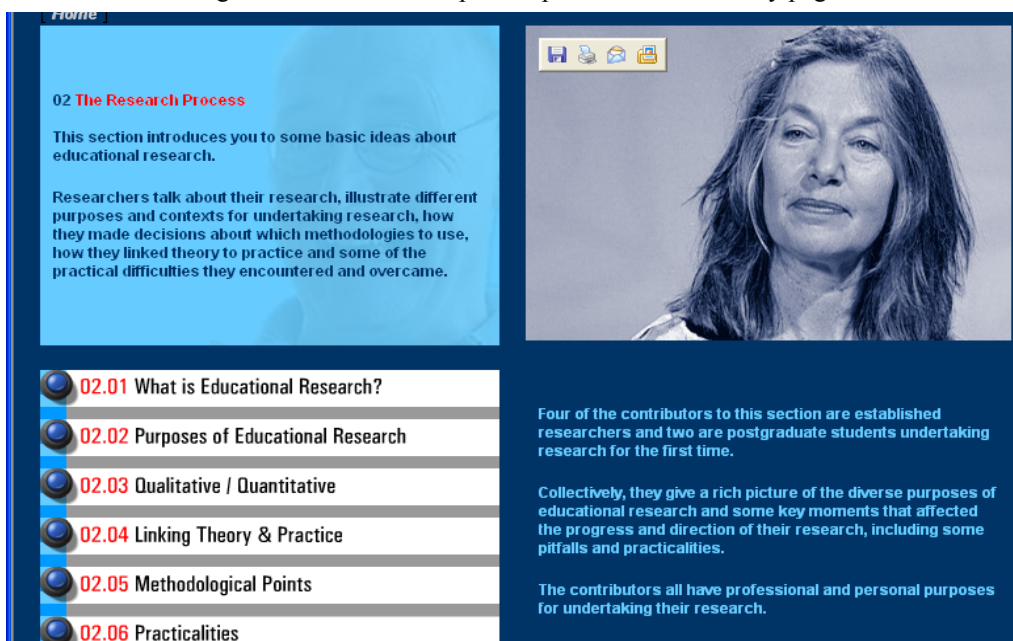Figure 2 Student and 'expert' experiences introductory page

Figure 2 above shows the introductory page of a section of educational research from researchers' perspectives. In these pages, the video clips of researchers are controlled by the user and content is introduced and developed through text-based 'advance organisers' (Ausubel, Novak and Hanesian, 1978), reflective questions and references to supplementary literature and on-line resources. The contested nature of educational research concepts and processes underpins the presentation of definitions of terms included in the glossary (See Figure 3 below). The same glossary word is defined by different researchers, demonstrating the complex multiple representations of educational research knowledge that are often overlooked in many paper-based texts.

Figure 3 The Glossary page

RATIONALE FOR PRODUCTION

Given the general direction of epistemological thinking from positivist to post structural and post modern in educational research (Gitlin, 1994; Scott and Usher, 1996, Usher and Edwards, 1994) and associated questions around representation and legitimation, the so-called 'truth' of educational research activities has come under scrutiny. This more sophisticated intellectual approach to educational research is not easily accessible using a paper-text, but IMM give an opportunity to represent, for example, contested concepts (Gallie, 1955) in a unique form, using video clips of real researchers who understand their work and contexts in subtly different ways. Making such knowledge forms available using the new medium of IMM supplies the increasing demand for high quality educational research training in Masters and doctoral programmes, especially those involving distance learning and part time study (Barrett and Lally, 2000; Birbili, 2001).

As well as changes in knowledge paradigms, Higher Education is also facing changes in technology, learning resources and pedagogy (HEFCE, 2003; ESRC, 2001). There is a need for higher education teaching to change from a didactic, transmissive mode to a more student-centred approach in which students actively engage with and construct knowledge for themselves as autonomous learners. This is necessary in order to meet the workplace demands for transferable skills; to adapt to rapid change in the knowledge-base of society and to encourage more critical and reflective awareness of change and its impact on society.

The final rationale for the production of the e-research CDRom is the need for sustainability with respect to improving long term effectiveness of learning at the same time as avoiding tutor burn-out (Goodyear, 2001). In the example of a small scale, well-resourced Masters course such as the M Ed in E-Learning at the University of Sheffield, the demand on tutor time is very high. An IMM resource contributes to a reduction of on-line tutor time with an enhancement in quality of learning and teaching. For example, to assemble together the same number and diversity of researchers, students and materials in a physical location would be impossible to achieve in a cost-effective way. Moreover, accessibility to such a wide range of perspectives and challenging ideas would be a problem if presented in written texts. This IMM resource serves as an additional and complementary resource to the conventional mix of tutor support, on-line resources, paper-based texts and peers available to the networked learning community. However, being at a pilot stage of development, the question

remains – how effective is the e-research CDRom for learning about educational research methodologies at postgraduate level?

THE E-RESEARCH CDROM AND LEARNING: ISSUES ARISING

The next section will focus on research in learning and design features of the e-research CD Rom. For the purposes of this paper, constructivism and grounded design as espoused by Land and Hannafin (2000) form the theoretical framework of the paper. In the light of the research and my development work with the CDRom, I identified the following learning issues. These are discussed separately but there is considerable overlap and interplay between them.

Non linearity

Although there exists a clear convergence between behaviourist learning theories and the process of computer programming, that makes the breaking-down of information into logical steps, leading to a linear route through a learning resource a preferred approach (Atkins, 1993), the e-research CD Rom, favouring a constructivist theoretical frame, gives responsibility to the learner to construct their own route through the resource. This way, the learner assumes greater control and freedom to decide which sections to visit, when to visit, the sequence of visits and how long to spend on each section. The learner can skip irrelevant information, repeat, review and control their learning (Cairncross and Mannion, 2001). A non-linear format gives learners control over judgements about their existing knowledge and how connections can be made between this and new knowledge.

Navigational framework

The menu system of the e-research CD Rom has a 'vaguely' hierarchical structure, in which the learner can follow an ordered sequence and/or take his or her own path. Mayes (1993) argues that this provides a framework within which learners can navigate, 'where they are free to tailor the order in which information is presented to meet their own needs…..an environment where a learner can seek information in pursuit of understanding' (Cairncross and Mannion, 2001, p 160). The navigational framework of the e-research CD Rom is what they call 'middle ground' – it is not completely structured and not completely unstructured – it allows learners to construct their own route through at the same time as providing guidance to prevent the learner ambling directionless through the resource (Laurillard, 1995). Maor's work (2000) supports this compromise situation between structure and no structure. In this research, two routes through the programme were available – the 'Constructivist Tour' which was open-ended and the 'Didactic Guided Tour'. The findings indicate that the former lacked clear explanation, was slow and laborious, whilst a compromise tour between the two extremes was preferred because it allowed learners to become familiar with the programme by providing scaffolding, and to navigate successfully before engaging in the material.

Flexibility

In an attempt to offer opportunities for learners to relate new knowledge to existing knowledge, to engage with new concepts and ideas and to clarify and challenge their thinking through reflection and critique, a wide range of material, modes and tasks are provided in the e-research CD Rom. Advance organisers (Ausubel et al, 1978) provide briefings at the beginning of each section and alongside each video clip to support learners in relating the material available to their existing knowledge and raising it to higher levels of knowing. Material is available in different modes (as video images and sound, text, slides and hypertext) and, given the wide range of contexts of researchers' stories, a variety of experiences of educational research is presented. The range of knowledge, supportive texts and reflective tasks available is intended to offer flexibility to users who draw on different learning strategies and bring different prior experiences to the IMM. Cairncross and Mannion (2001) explain how the ideal of adapting the resource to meet each learner's individual requirements in the case of IMM would be impossible in terms of cost-effectiveness because users' learning strategies change according to contexts and learners bring different understandings to each learning activity. In any case, tailoring a resource specifically to an individual learner's needs negates the aim of giving more responsibility to the learner as manager of her or his own learning. In connection with this latter point, hyperlinks provide access to appropriate web sites and increase flexibility at the same time as maintaining learner autonomy.

Multiple representations

The e-research CD Rom contains pages of video extracts, texts and the glossary covering a wide range of perspectives – designed to represent real world situations in which each person's understanding of educational research terms, concepts, processes and activities is uniquely nuanced and personalised. This design feature of the CD Rom was introduced to replace the over-simplified, reductionist conceptualisation of challenging research phenomena in some paper–based educational research texts. The team wanted to illustrate the messiness and complexity of educational research by drawing on authentic case studies of researchers working in the real world. In this way, the resource simulated the real world and its problems, providing multiple representations of knowledge in the form of a range of different experiences in a variety of contexts through researchers' eyes. Maor (2000, p 311) describes how: 'access to multiple representations challenges the learner to construct creative investigations requiring complex decision- making'. Having control over these multiple representations gives learners time for reflection to think through complex and positioned knowledge and provides access to learners who use different learning strategies (Cairncross and Mannion, 2001).

Barrett and Lally describe their intentions in the design of the 'Signposts for Educational Research' CD Rom:

> to emphasise the personal nature of research and highlight the idea that a wide range of responses to problems of subject, structure and process is possible. The research process, we suggest, involves competing perspectives in which decisions are personal and therefore contestable (2000, p 273),

illustrating the view of knowledge underpinning the e-research CDRom as a socially constructed phenomenon, not as an objective entity existing outside the knower that can be 'acquired' through the learning process.

The 'conceptual complexity and case-to-case irregularity' found in knowledge domains, Spiro, Feltovich, Jacobson and Coulson (1991) argue, require increased 'cognitive flexibility' on the part of the learner. The computer, because of its capacity and flexibility, can foster this approach by making available different conceptual and case study examples in multi-dimensional form. The authors refer to this using the metaphor of a 'criss-crossed landscape, with its suggestion of a non linear and multidimensional traversal of complex subject matter' (Spiro et al, no date, retrieved 2004, p 9) The complex, ill-structured knowledge of educational research methodology represents the sort of knowledge domain compatible with Spiro et al's theorisation. By accessing a wide variety of perspectives, retrieving prior knowledge and generating what Spiro et al refer to as 'context-sensitive' knowledge, the learner develops a 'rich palette' to help understanding. However, cognitive flexibility theory understands knowledge as something that is 'acquired', even though it claims a social constructivist frame. The epistemology underpinning the knowledge embedded in the e-research CDRom is one of partiality, positionality and social mediation, not acquisition .

Authentic tasks in real world contexts

Two features of the constructivist IMM programme used by Cairncross and Mannion (2001) in their professional development workshop for science teachers were simulated authentic learning environments and opportunities to reflect upon real life situations. One of the participants in their research reflected positively on the value of using

real life data as addressing issues of 'relevance, motivation and scientific method' (p 322). The e-research CDRom cannot provide the 'real' learning environment in the learners' community argued for by Brown et al (1989), nor can it provide the 'real' experience of the intellectual community within which the subject knowledge and values are being learned (Van Oers, 1990). To do so would incur considerable expense, time and energy on the part of the tutors. Instead, images of real researchers talking about their activities and values in the research community provide an environment for 'real' learning in a vicarious sense. Learners can link their own conceptual and practical experiences with the real life stories shown and:

> the surrogate experience of reality facilitates transfer of learning 'as principles, rules, emotions, mistakes, issues, meanings are observed, engaged with, reflected upon, questioned and analysed (Atkins, 1993, p 261).

Learners are more likely to identify positively with a video image of a speaking person, acting as a symbolic representation of reality, telling an authentic story, than they are with paragraphs written in a textbook. This human factor builds a bridge between the existing knowledge of the learner and the new knowledge being presented. Even though an IMM resource cannot operate in the contingent and adaptive way that a tutor teaches, video clips with supporting texts and tasks can offer accessibility to issues in a non-threatening way through immersion in a realistic context in which students perceive the relevance and significance of the researchers' experiences to those of their own (Harper and Hedberg, 1997).

The affective domain and the educational research community

The multiple perspectives illustrated in the e-research CDRom provide an opportunity to understand research as an emotional as well as a cognitive activity. For example, Jennifer Lavia, one of the contributors to the e-research resource describes her experience of interviewing respondents in her research:

> The interviews were unstructured and they were, in fact, 'systematic conversations' with those elders … who … in education … those teachers in education who had retired from the system, but had contributed significantly to the system. So that process was not only a technical one but it was very much an emotional one for both the interviewer and the interviewee. I felt as though I was honouring the interviewees for their contribution at the same time I was honoured by them allowing me to have access to their voice (Jennifer Lavia).

Lally and Barrett (1999) were interested in the role of socio-emotional communication in their research into whether asynchronous CMC lessened the sense of 'distance' and social isolation felt between distance learning students. Evaluation returns from their students indicated that 'on-line social interaction had formed an important part of their experience' (p 153) and had helped them to feel part of a community. Whilst recognising that the community of researchers shown on the CDRom can never be more than a **vicarious** community, it is intended that, by relating the socio-emotional aspects of their research, they build a sense of group identity that helps learners to feel part of a wider community of educational researchers. Evaluation of the 'Signposts' IMM resource revealed that 87% of evaluators agreed that including peer voices in the resource encouraged a sense of 'student community'. Qualitative responses to the evaluation questions suggest that the benefits of the student community include feelings of empathy, confidence and empowerment:

> The evaluation findings suggest that the use of affective IMM materials can create empathy between some users and the 'constituency' which is represented (in this case a student community). We feel that the evaluation return comments suggest that having access to a relevant community within an IMM environment can be experienced as 'empowering' to the user (Barrett and Lally, 2000, p 282).

Similarly, a view of educational research as both cognitive and affective enquiry underlay the work of the e-research team as we attempted to challenge the view of educational research as 'neutral' and 'objective'.

Reflective thinking

Reflection is the fourth category of the framework of analysis of the teaching and learning process presented by Laurillard (1995, p 180). She describes it as:

> ….. that part of the process where the learner has to consider the implications of their experience, the teacher's description and their own previous conceptions, and bring all these together into a coherent new description – the culmination of the learning process in new conceptual knowledge (p182).

According to Laurillard, reflection is internal to the learner, takes time and effort, is contiguous with the learning experiences and serves an integrative purpose by linking experiential and conceptual knowledge. Laurillard argues that because some IMM resources are neither adaptive nor reflective, they offer little more than a library in terms of providing opportunities for the development of reflective practice. She proposes six design features of IMM to support learning that are perhaps more appropriate to school-aged students working within an 'objective' view of knowledge. Barrett and Lally (2000) tested the argument about reflectivity through the design and evaluation of their 'Signposts' CDRom. They posed the question 'Can affective material be used in the IMM resource in order to promote the development of critical thinking skills such as reflection-on-practice?'(p 285). 40% of evaluators thought that the support for reflective tasks was useful; 40% described them as not useful. However, 93% of evaluators thought that materials encouraging the idea of reflective practice were appropriate for post-graduate research teaching and 87% thought it possible to provide such materials through IMM resources such as a CDRom. One evaluator believed that the reflection would occur **after** using the CDRom, not during its use. The authors concluded that the CDRom does encourage reflection, but 'there is clearly considerable less certainty about whether it achieves this' (p286), suggesting a need and direction for future research.

Student and 'Expert' Voices

The authentic video images and voices used in the e-research CDRom consist of both research students' and Higher Education researchers' accounts explaining their understandings and describing their good and bad experiences of doing educational research. This way, a diversity of 'stories' – from 'novice' to experienced researchers is accessible, allowing learners to compare and contrast their own understandings and experiences with those of others. Atkins, (1993, p 263) describes how comparing and contrasting their ideas with 'experts'

in her study 'sharpened discrimination and enhanced processing of information'.The peer and expert voices were included in an attempt to involve stories about the emotional side of research to engender empathy amongst users in order to build an holistic, real and collaborative culture and community in which learners identify with students and experts shown in the video clips. Barrett and Lally, (2000) found that this leads to an increase in learner confidence by demonstrating that everyone faces difficulties in carrying out research, these difficulties may be affective as well as cognitive or pragmatic, and these can be overcome.

Laurillard recognises the need for expert input into the learning process using IMM (1995). She proposes that access to an expert's analysis should occur **after** the learners have constructed their own analysis. She suggests that the 'guided discovery' method of learning she favours requires, in terms of design features of an IMM, access to 'an expert analysis for them (learners – CW) to check their own against' (p 188). This position assumes the learning process will have an end point and to be checkable in terms of its level of accuracy. In the case of the e-research CDRom, voices were included in the resource, not to represent a final, correct answer to educational research problems, but as representative 'stories' of research experiences to 'make connections' with or challenge learners' prior experiences in order to allay their worries and to demonstrate the contested nature of knowledge. As one evaluator of 'Signposts'stated, 'In some cases this (feedback) is inappropriate as the answers would be entirely personal and different for each individual. However, in some cases 'examples' of answers could be given' (p 286). In other words, the epistemological view embedded in the resource refutes the existence of absolute certainty or 'truth' in terms of 'right' and 'wrong' answers.

CONCLUSION

The overriding findings of the research into learning and IMM resources recognises that the tutor, as the 'more knowledgeable other' who scaffolds learning, is the real key to successful learning (Laurillard, 1995; Blissett and Atkins, 1993; Barrett and Lally, 2000). However, in the light of the changing face of higher education, there is a growing need for a reliable, robust, effective and innovatory learning resource that can be met by IMM such as the e-research CDRom. Its key strengths lie in its capacity to present multiple representations of real researchers – peer and 'expert', telling their stories under the 'control' of the learner. Its design features are framed around constructivism, which assumes that the learner socially mediates knowledge and that knowledge itself is a social construction that may be understood through different paradigmatic lenses. Most important is the underlying assumption that educational research is not a simple and straightforward activity, but one riven with complex sensitivities, ethics and epistemological perspectives particular to context. Limitations of the resource will be revealed during the evaluation and these can be anticipated as follows: accessibility for disabled users; limited interactivity and incomplete coverage of perspectives in educational research. Inevitably, there will be more issues to engage with following the evaluation and these will pave the way towards the further development and improvement of the resource. Directions for future research may include enquiries around the capacity of the resource to develop students' critical reflection and engagement with notions around politics and power underpinning educational research activities.

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