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Overview: New technology, learning and assessment in higher education

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Introduction

Higher education faces an age of mass graduation at a time of rapid development in information and communications technology (ICT). In the UK in the early years of the 21st century there is government pressure for increasing the proportion of graduates in the population. These changes are global of course, and frequently associated with enthusiasm for the potential of ICT to release economic growth (United Nations, 2000).

It is appropriate, therefore, to consider some of the directions that the use of ICT in higher education (HE) have taken, and might continue to take. For there are opportunities and choices to be made and these focus on the following issues—access, engagement, community, pedagogy and cost. With ICT we can *widen access* to include students at a distance and to accommodate groups unable to attend at specific times or even the same time.

In our research and development projects at Ultralab we have shown that we can promote 'delightful' and *engaging learning* and enquiry using ICT and in particular appeal to multi-modal humans through multimedia expression. Through online communities, ICT can also be used to *promote community*, citizenship and democracy. Online communities offer authentic voices to be heard widely and frequently challenging the concept of 'authoritative' voice, particularly in professional development. This then provides an opportunity for rethinking the curriculum and developing the *pedagogy* for adults.

Some propose that technology might be used solely to reduce *unit costs* and to 'capture' a growing international market—our evidence suggests this is misguided. In our view this would miss an opportunity for curriculum and pedagogic change which would enhance the role of HE in society and the economy.

Yet, some would say change in the use of ICT in HE is slow. Collis and van der Wende (2002), for example, in their international comparative study of current and future use of ICT,

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report that it is used mainly to focus on basic processes of writing reports and for instructors to transfer knowledge. Formal assessment using ICT is barely developing (Collis and van der Wende, 2002, p. 32). They note an emphasis on capturing a 'distance learning' market of overseas students through the use of new technology. This direction or 'catching the e-wave' has been encouraged by government policy for a number of years, as seen in the BBC news report *Universities told to catch the e-wave* (BBC, 2001) and is exemplified in the recently published strategy document *Harnessing technology transforming learning and children's services* (Department for Education and Skills, 2005).

But what evidence and what analysis is guiding this drive? This collection responds to this question with lessons learnt and emerging theory from researchers working at the leading edge in one of the largest and most successful research centres of recent years in the development of e-learning—Ultralab at Anglia Polytechnic University (APU).

Ultralab and some relevant higher education projects using new technology

Ultralab has successfully developed large-scale action research projects in a wide range of education phases and sectors over the last 15 years. Some of the most significant of these projects have produced innovations in online learning at the HE level. Ultralab personnel have taken an action-research approach in the roles of researcher and practitioner, of consultant to external organisations and of service provider.

Early work in the 1980s included combining Prestel and Telecom Gold to produce British Telecom's Campus service. Ultralab led the Renaissance project in the early 1990s, which created new multimedia learning materials for university courses in a range of disciplines, collaborating with other HE institutions in the UK, partly in response to the availability of the CD-ROM for distribution and the new cost-effective and creative multimedia tools. During the 1990s work with the Department of Trade and Industry, The Federation of Electronic Industries and its members led to Ultralab developing Schools OnLine, the first substantial database-driven community website, with 72 schools, their teachers and students working in partnership with the school and HE sector. Ultralab also worked with Nortel on a seven-year longitudinal action-research 'Learning in the New Millennium' (Chapman, 1997; Chapman & Ramondt, 1998) which formed the basis for many of the hypotheses tested in later projects.

In the mid-1990s, Ultralab investigated the use of online communities for learning as an early pilot for the University for Industry, sponsored by the Institute for Policy Research (IPPR). Subsequently, the lessons learnt were applied in the Small and Medium Enterprise Internet Learning Experience (SMILE) project, which linked partners in the automotive manufacturing industry, promoting learning through an online community of practice.

Each of these projects was informed by the cross-disciplinary nature of the growing Ultralab team and cross-fertilisation from projects utilising similar pedagogies and technologies in other phases and sectors of education. For example, Ultralab's next large-scale project at this level was informed by the ambitious proposal to offer an email community to every school child in the UK, made in the 1997 incoming government's manifesto.

Ultralab embarked upon an ambitious project to design a web-based software environment to deliver such a proposal. The features of the environment were that access could be achieved

from any computer anywhere in the world via web browser, that storage spaces should be available for individuals to document and archive their ideas and work, and that groups of individuals would be able to exchange ideas in communities of learners and enquirers. Fundamentally, the platform was designed to give authoring tools to users, students and tutors rather than administrators, technology experts or web designers. This brief was eventually developed in partnership with Oracle and produced under the title 'Think.com'. Oracle offered this environment free to schools as part of a public service function.

The same tools and concepts were used by Ultralab working with the Department for Education and Skills and later the National College of School Leadership (NCSL) for developing an online community of *practice* for headteachers in England: Talking Heads (Ramondt *et al.*, 2002; Chapman & Ramondt, 2003). Subsequently, online communities for *learning* were developed including Virtual Heads leading to National Professional Qualification for Headship (NPQH). The online communities have ensured that the online NPQH is sufficiently substantial and supportive to be a mandatory qualification for all aspiring head teachers. Since the pilot, Ultralab has worked in partnership with the NCSL to develop online communities to support the majority of their programmes and courses. The impact, and thus the value, of online community as outlined above was recognised by independent evaluation (McFarlane, 2002). NCSL has now built on this work to develop their own online community called 'Talk2Learn' and all their programmes are using this—at the time of writing there are 59,000 registered users.

Throughout the 1990s Ultralab was also leading the development of online modules to smaller numbers of students in the APU School of Education. Its experience here led to taking an advisory role to colleagues in other departments and schools of the University, sometimes providing action in the shape of technical support as well as support at the course validation stage.

In 2003, Ultralab has taken the next step, pioneering a degree course—the Ultraversity degree—which aims to widen participation by offering a wholly online programme to students in their own context, basing their study on their own daily work or professional life and thoroughly embracing a model of learning based on action research, engagement with a community of researchers (students) and finally communication to real audiences.

The innovation in this HE-level degree has been founded on the radical practice developed in all of the projects listed above. In addition, and unmentioned so far, has been the experience of Notschool.Net—the project Ultralab has created to provide an online education for long-term school absentees. There is also the eVIVA project to invigorate assessment with the use of self-selection of targets and testing through the telephone for 14-year-olds in school, amongst many others (McGuire, 2005).

Ultralab's large number of diverse projects are nevertheless linked by an underlying common set of values and a framework of concepts which we hope show in this collection of papers, but are discussed further in this section in order to clarify as an overview.

The role of HE and learning

Ultralab's work sees a key role for HE in a knowledge-based, global society and economy. Barnett emphasizes that 'Universities must play their part in generating the learning society by becoming democratic institutions' (2000, p. 52).

Ultralab's interest is in the way that HE, through the use of technology, can promote democratic action and improvement, yet also involve an increasingly geographically distanced, part-time and diverse student body. Barnett argues for the university's role in widening life chances, 'engaging vigorously with the local community at all levels' (2000, p. 51). Such engagement is at the heart of Ultralab's thinking, and also fits the local and regional remit of our host university, APU.

An overview of the concepts which underlie the Ultralab philosophy are indicated in Figure 1, and developed further below.

New romantic

Hargreaves (1975) identified three teacher stereotypes—the 'lion tamer' and the 'entertainer' which are contrasted with a third type, the 'new romantic'. Only the last of these believes, as does Ultralab, that learners want to learn and that the natural inclination for human beings is to be inquisitive, creative, active and receptive. The learner as a child naturally acquires knowledge and skill, and that this does not disappear with age. Learning requires active participation.

Figure 1. Concepts underpinning Ultralab's R&D at HE level

Involving people in their learning rather than 'delivering' it to them as passive recipients is a responsibility, and in our research we focus on how this might be achieved with new technology.

Delight

The notion of delight in learning deserves further attention, particularly when related to the development of new technology. If technology is purely to increase efficiency it can become inhuman if not inhumane. Technology that brings people together rather than isolates, that celebrates success, is engaging. Delightful is used here in both the sense of amusing, entertaining and cheery, and in the sense of captivating, engaging and enchanting. Learning should also be aesthetically pleasing, refreshing and satisfying.

Too much technology may be criticised for being none of these things. A clumsy, fragmented or solitary experience is not good for the learner or for learning. We, at Ultralab, choose to research, develop, discuss and debate how to use technology for learning that is full of 'delightful' moments, not dreaded ones. More importantly we develop and implement designs for technology which pay attention to this affective aspect of its use.

Critical action

> The key policy lesson from Talking Heads is that a successful community of practice can unlock vast resources from within the community making rapid progress in professional development achievable and enjoyable whilst building an authentic dialogue between policy and practice. (Heppell, 2000)

The term 'authentic dialogue' in this quotation refers to the university as a centre for critical action, indeed making the world a better place. We conceive that the central activity of learning, the evaluative, extended dialogue—Dearing's 'Learning Conversation' (Dearing, 2000)—is engaged in purposefully in order to make impact on public understanding, professional practice and more originally, on policy. This means that learning is not only building a relationship with recorded knowledge, but includes creating knowledge in discussion with other practitioners and occasionally policymakers. Learners in this situation are never in doubt about the importance of their learning, nor concerned that the abstractions and theory are somehow unreal—they become an essential element of communication, proposing and disputing what matters in the sea of shared experience. They are confident that their debate will lead to change and with every prospect of improvement in their own and other practitioners' context. Significantly, they know they have the ear of those charged with national policy and a direct link can be made from the outcomes of their personal research and input to the national decision-making process.

Ultralab's view is very much on the lines of Ron Barnett's notion of 'Critical Action' (Barnett, 1990, 1997, 2000) and Judith Sachs' 'Activist' notion (Sachs, 2003). For us it is not enough to study, and know 'what'. Knowing how to act, ethically and democratically, is essential, but so too is the very act of doing. We have, for example, developed the notion of seeking an authentic audience for assignments in education, and latterly are developing the notion of 'the exhibition' of work and learning as a fundamental to ensuring that a single person's ideas are negotiated with peers, stakeholders and a wider community.

New assessment

In our work we support the role of education in general and HE in establishing a qualification framework and in the use of new technology in making assessment more delightful, relevant and purposeful; McGuire illustrates this in her work on the eVIVA project (McGuire, 2005). Technology has offered, through communication and storage, capacity to organise and share assessment products as they take shape, thus unlocking process, enriching scope and thus avoiding plagiarism, since these activities may be linked to the learner's identity and past engagement.

Qualifications

We believe that qualifications are important because they enable candidates, including the least advantaged, to get to interviews for jobs. They are not the only qualities candidates possess but our realism leads us to believe they are important 'currency' in the real world for this first step. Learning using new technology should go beyond merely delivering qualifications, however.

The generic skills of graduates and postgraduates in terms of critical analysis and reflection, the ability to research, conceptualise, generalise, and at higher levels, develop new perspectives and original contributions to knowledge can be enhanced and underpinned by the use of new technology. The origins of the World Wide Web and the Internet were of course in academia, not in commerce or any other field.

Change in the nature of knowledge

The United Nations (UN) report of the Economic and Social Council (2000), like many others placed great faith on new technology being at the heart of 'the emerging knowledge based global economy' (United Nations, 2000). Ultralab agrees, but also sees a vital role for HE to be at the centre of knowledge and skills updating. The research, development and theory making, which is central to HE, enables institutions to play a part not just in initial professional education but also continuously throughout an individual's career and the technology of the Internet enables a close bond to be maintained with former students over geographic distance.

In the modern technological age, access to recorded knowledge is potentially available to all, exemplified by the free online encyclopaedia, dictionaries and thesaurii. Google alone will find 221,000 web sites that mention Habermas in 0.16 seconds and 563,000 web sites in 0.15 seconds referring to Descartes. In the field of scholarship there is ample content available. Clearly, skills of retrieving the important, selecting quality and making sense of it all are much more at a premium. HE, focused upon skills of critical evaluation of this material, should be well placed in the modern age.

Yet what counts as knowledge is itself rapidly changing and dynamic. Indeed HE is and should be at the forefront of developing new perspectives and conceptualisations. It is amusing to see, for example, that many a child in the UK can now describe plate tectonics in a way that was not possible even 30 years ago. The field has moved on significantly so that many are aware of, for example, 'sea floor spreading' and the significance of the mid-Atlantic Ridge. So too with other fields of enquiry. Technology can and should be used to promote the active development of knowledge and understanding and not to cement it as a static object.

Practitioner knowledge and lived experience in the form of tacit knowledge is also an important factor. The propositional knowledge found in libraries, research journals and web archives is but one form. As equally important and certainly relevant is the lived experience of the practitioners working in their field. Hence technology that enhances the capacity of people to articulate their tacit knowledge, to synthesise their lived experience, and to make generalisations is for us 'good'. We believe in Kurt Lewin's dictum that there is nothing so practical as good theory (Hopkins, 1994). For us technology can be used to articulate practice and build knowledge. HE's role in that pursuit is central.

Personal and professional development

Ultralab believes that technology can be used to empower people, to involve them as active citizens, to unleash their creativity and enthusiasms. In our projects we have noted the connection between the participants' development as professionals and their development as people. This connection between personal and professional development has been noted in the work of Day (1999), Kinder and Harland (1991) and others.

We note that our students take leadership roles using the tools of technology at their disposal to influence society and change. It is of no surprise in our work to find web sites, online galleries and conversations developing beyond that which we planned as tutors. Indeed we encourage it to happen.

Research capability

We believe in research-based practice and discourse. Research may be of many kinds but we promote active participation of practitioners in the systematic collection of data, reflection on their experiences and in the sharing of generalisation from their experience. We believe in collaboration in research, and in sharing insights through dialogue and debate—primarily online where sharing is most cost-effective and may be enduring.

Research in our field of innovation often means that we have to accept that we are driven by principles and values. In Denzin and Lincoln's terms we are post-relativists who celebrate and acknowledge the bias of our conviction (Denzin & Lincoln, 2000). We believe in the power of technology but seek to find out how to unleash that power. We frequently work with innovations where we and other users have little experience of how to make it work. We frequently work with other enthusiasts for our innovation as collaborative explorers. We accept that our collective perceptions may not yet be everyone's but are convinced that the stories we tell of our experiences are valuable insights into how things can be.

Community of practice and enquiry

We believe in the notion that important learning is situated in context, one form is that of being in a 'community' (Lave & Wenger, 1991; Wenger, 1998). Our projects seek therefore to build communities of learners, engaged in a common enterprise. Allen, Roberts and others explore this notion further in the papers of this work.

The experiences of practice outlined by a practitioner are a bedrock of learning for the inexperienced as well as a generator of reflection for the more expert. However, we also believe in enquiry, in exchanging information derived from secondary sources and in active, reflective research by practitioners. Hence, our Notschool participants, and our Ultraversity undergraduates are called 'researchers', and our staff are 'facilitators'. Clearly, underpinning this is the notion of continuous professional learning in learning organisations.

New tools, online

Our ongoing and extensive research with participative and online technology tools persuades us that all their functionality must be in the hands of the users. Only then can they be used creatively and democratically. We seek to wipe away barriers where they occur. For instance, all users should have the power and 'privileges' (an interesting technical term in some software) to create community or conferencing space, to create conversations between community users or to contribute to community discussions. So many software platforms are designed to replicate or reinforce old-fashioned power structures and counter the fear of anarchy.

The cost of giving tools to users can be a vibrant chaos, as users create and develop communities, conversations and learn to express themselves using the medium. So in the recent Ultraversity project, like others we find growth of communities, conversations and items like 'virtual art galleries' developing outside of the plans of the course leaders. Our response is to say 'good, and how can we help this extended curriculum develop', in the same way as any university might encourage discourse beyond the lecture theatre, and in the bar or coffee shop. Yet we seek to develop ways of having both empowering tools and at the same time structured architecture to allow learners to create navigable, searchable and ultimately useable spaces.

Tools also can permit another kind of freedom, that of choosing modality which suits the cognitive style (or mood) of the learner. This choice must be available to the learner to express ideas in different forms (prose, poetry, song, essay, documentary film etc.), media (audio, visual, textual etc.) and structure (hypertext, database, linear text, movie etc.). Rarely do learners have such options, nor tools which are designed to support fully the abstractions and skills required. They are better served by the tools to 'read' such material, but these multimedia players and browsers are sadly lacking in the capacity to research for relevant material (in all but text form) and to appropriate quotations, by cut and paste, for the learner's own expression of ideas. Multimedia content will fail as a resource for HE until these issues are understood and tool designers address them.

Conclusion

With this discussion of some parts of Ultralab's belief system, we urge the reader to enjoy the following papers. In good constructivist style, we anticipate the reader's interpretation may differ from ours, and look forward to the developing and challenging dialogue in years to come.

Notes on contributors

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